GOVERNMENT'S ANALYSIS,
ASSESSMENT AND RESEARCH ACTIVITIES

Katariina Nilsson Hakkala, Ville Kaitila,Tero Kuusi,
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Abstract

Economic policies of the European Union (EU) are based on promoting open and predictable international trade. EU Free Trade Agreements (FTA) is an important tool for achieving this objective. In this study, we analyse the impact of the EU FTAs on goods and services, value added, direct investment, employment and gross domestic product (GDP) in Finland. We focus on estimating the economic impact of the FTAs concluded during Finland's EU membership since 1995. The analysis shows that Finland's exports have increased markedly in many countries that have entered into FTAs with the EU since 1996, but the increase in exports seems to be explained by the general globalisation of trade rather than FTAs. At the aggregate level, our results suggest that the FTAs that came into force since 1988 have significantly increased EU trade with partner countries. The most comprehensive FTA has increased EU exports to partner countries by around 34% and imports by 14%. The larger average effects on EU trade are explained at least in part by the importance of the agreements concluded before Finland's membership of the EU. However, although the EU FTAs have had a weaker effect on Finland's exports than on EU countries on average, they have increased exports in some industries significantly. The industries that have benefited most from the EU FTAs are forest industry, machine and equipment manufacturing, and business services that support trade in goods. In addition, agreements have increased production in Finland through global value chains. For trade in goods, the effect of free trade agreements, concluded after 2004, on value added in Finland is estimated at around 1.6% of total value added in export sales, which is slightly below the EU average of 2.0%. We also find that the agreements have contributed positively to foreign direct investment, trade in services, employment and GDP. Our results support the use of FTAs as a tool for economic policy, but the scope and depth of the agreements and the functioning of other international institutions are crucial how large impact they have on trade. Not even the broader agreements can replace the transparency, predictability and dispute resolution mekamism provided by the World Trade Organisation, WTO. That is why the EU should strive, not only for new and comprehensive free trade agreements, but also to support the continuation of WTO reforms and to guarantee its ability to act in the future.

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Tiivistelmä

Euroopan unionin (EU) talouspolitiikan perustana on pyrkimys edistää avointa ja ennustettavaa kansainvälistä kauppaa. EU:n vapaakauppasopimukset ovat keskeisiä välineitä tämän tavoitteen toteuttamiseksi. Tässä tutkimuksessa arvioimme EU:n vapaakauppasopimusten vaikutuksia tavaroiden ja palvelujen ulkomaankauppaan, arvonlisään, suoriin sijoituksiin, työllisyyteen ja bruttokansantuotteeseen (BKT) Suomessa. Keskitymme arvioimaan Suomen EU-jäsenyyden aikana, eli vuoden 1995 jälkeen solmittujen vapaakauppasopimusten taloudellisia vaikutuksia Suomelle. Havaitsemme tutkimuksen perusteella, että Suomen vienti on kasvanut merkittävästi moniin maihin, jotka ovat solmineet vapaakauppasopimuksia EU:n kanssa vuodesta 1996 lähtien, mutta kaupan kasvua vaikuttaa selittävän yleinen globalisaatiosta johtuva kaupan lisääntyminen pikemminkin kuin vapaakauppasopimukset. EU:n tasolla havaintomme viittaavat siihen, että vuoden 1988 jälkeen voimaan tulleet vapaakauppasopimukset ovat lisänneet merkittävästi EU-maiden ulkomaankauppaa. Mahdollisimman kattava vapaakauppasopimus on lisännyt EU:n vientiä kumppanimaihin noin 34 prosenttia ja tuontia 14 prosenttia. EU-tasoiset suuremmat vaikutukset selittyvät ainakin osittain Suomen EU-jäsenyyttä edeltäneiden sopimusten merkittävyydellä. Vaikka vapaakauppasopimusten kokonaisvaikutukset ovat jäänet EU:n keskimääräistä vaikutusta heikommiksi Suomessa, niillä on kuitenkin ollut merkittäviä positiivisia vaikutuksia vientiin joillakin toimialoilla. Suurimpia hyötyjiä ovat olleet metsäteollisuus, kone- ja laitevalmistus sekä tavarakauppaa tukevat liike-elämän palvelut. Lisäksi vapaakauppasopimuksilla on ollut myönteinen vaikutus Suomen tuotantoon arvoketjujen kautta. Tavarakaupan osalta Suomessa vuoden 2004 jälkeen voimaan tulleiden vapaakauppasopimusten arvonlisävaikutuksen voi laskea olevan noin 1,6 prosenttia viennin kokonaisarvonlisästä, mikä on hieman EU:n keskiarvon (2,0 prosenttia) alapuolella. Havaitsemme myös, että sopimukset ovat vaikuttaneet myönteisesti suoriin investointeihin, palvelukauppaan, työllisyyteen ja BKT:hen. Tuloksemme antavat tukea vapaakauppasopimusten käytölle talouspolitiikan välineenä, mutta sopimusten laajuus ja se miten muut kansainväliset instituutiot toimivat, ovat keskeisiä kauppavaikutusten suuruuden kannalta. Laajatkaan sopimukset eivät pysty korvaamaan Maailman kauppajärjestön, WTO:n, kansainvälisiin kauppasuhteisiin tuomaa läpinäkyvyyttä, ennustettavuutta ja riitojenratkaisumekanismia. Siksi EU:n tulisi pyrkiä, paitsi uusiin ja laajoihin vapaakauppasopimuksiin, myös tukemaan WTO:n uudistusten jatkamista ja takaamaan sen toimintakyky myös tulevaisuudessa.

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Referat

Europeiska unionens (EU) ekonomiska politik bygger på att främja en öppen och förutsägbar internationell handel. EU:s frihandelsavtal är viktiga verktyg för att uppnå detta mål. I denna studie analyserar vi effekterna av EU:s frihandelsavtal på utrikeshandeln med varor och tjänster, förädlingsvärde, direktinvesteringar, sysselsättning och bruttonationalprodukt (BNP) i Finland. Vi fokuserar på att analysera de ekonomiska effekterna av de frihandelsavtal som ingåtts efter 1995 under Finlands EU-medlemskap. Resultaten visar att Finlands export har ökat markant i många länder som har ingått frihandelsavtal med EU sedan 1996, men ökningen i handeln verkar förklaras av den allmänna globaliseringen av handeln snarare än frihandelsavtal. På aggregerad nivå tyder våra resultat på att de frihandelsavtal som trädde i kraft sedan år 1988 avsevärt har ökat EU:s handel med partnerländer. Det mest omfattande frihandelsavtalet har ökat EU:s export till partnerländerna med cirka 34% och importen med 14%. Den större genomsnittliga effekten på EU:s handel förklaras åtminstone delvis av betydelsen av de avtal som slutits före Finlands medlemskap i EU. Trots att EU:s frihandelsavtal sammantaget har haft en svagare effekt på Finland's export än på EU-ländernas export i genomsnitt, har de dock haft betydande positiva effekter på exporten i vissa branscher. Branscher som dragit den största fördelen av frihandelsavtalen är skogsindustrin, maskin-och utrustningstillverkning samt olika företagstjänster som stöder varuhandel. Dessutom har avtalen ökat produktionen i Finland genom globala värdekedjor. När det gäller handeln med varor uppskattas effekten på förädlingsvärde av frihandelsavtal som ingicks i Finland efter 2004 till omkring 1,6% av exportens totala förädlingsvärde, vilket är något under EU-genomsnittet på 2,0%. Vi konstaterar också att avtalen har bidragit positivt till direktinvesteringar, handel med tjänster, sysselsättning och BNP. Våra resultat ger stöd till användningen av frihandelsavtal som ett verktyg för ekonomisk politik, men avtalens omfattning och hur andra internationella institutioner fungerar är avgörande för hur stor inverkan avtalen har på handeln. Inte ens de bredare avtalen kan ersätta den transparens, förutsägbarhet och tvistlösningsmekamism som Värdshandelsorganisationen WTO tillhandahåller för den internationella handeln. Därför bör EU sträva, inte bara för nya och omfattande frihandelsavtal, utan också för att stödja fortsättningen av WTO: s reformer och garantera dess handlingsförmåga i framtiden.

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Contents

List of abbreviations

ASEAN	Association of Southeast Asian Nations, comprising of ten nations in the Southeast Asia
BIT	Bilateral Investment Treaty
COMTRADE	UN Commodity Trade Statistics Database
CU	Customs Union
EEC	European Economic Community (predecessor of EU)
EEA	European Economic Area
EFTA	European Free Trade Association (current members: Iceland, Liechtenstein, Norway, and Switzerland)
EMU	European Monetary Union
EPA	Economic Partnership Agreement (one type of EU's trade agreements)
EU	European Union
FDI	Foreign Direct Investment
FTA	Free Trade Agreement
GDP	Gross domestic product
GPA	Agreement on Government Procurement
GVC	Global value chains
GSP	Generalized Scheme of Preferences (grants preferential treatment regarding tariffs to developing and vulnerable economies)
HS	Harmonized System (a classification for tariff codes)
ISIC	International Standard Industrial Classification (a classification for tariff codes)
MERCOSUR	Trade bloc of Argentina, Brazil, Paraguay and Uruguay
MFN	Most Favoured Nation
MLR	Multilateral resistance terms in the gravity model
OECD	The Organisation for Economic Co-operation and Development
PTA	Preferential Trade Agreement (only partial liberalization of trade that can be non-reciprocal)
ROW	Rest of the world
RTA	Regional Trade Agreement (reciprocal trade agreements, includes e.g. FTAs)
SADC	Southern African Development Community: Botswana, Lesotho, Namibia, and Eswatini (Swaziland)
WIOD	World Input Output Database
WTO	World Trade Organization

Tutkimuksen tiivistelmä

Euroopan unionin (EU) talouspolitiikan perustana on pyrkimys edistää avointa ja ennustettavaa kansainvälistä kauppaa. Vapaakauppasopimukset EU:n ja sen kauppakumppanien välillä ovat keskeisiä välineitä tämän tavoitteen toteuttamiseksi. Vapaakauppasopimuksilla pyritään alentamaan kaupankäynnin välittömiä kustannuksia ja helpottamaan taloudellista yhteistyötä sisällyttämällä sopimuksiin muun muassa investointeja, teollis- ja tekijänoikeuksia, julkisia hankintoja ja teknisiä standardeja koskevia lausekkeita. Viime aikoina sopimusten pyrkimyksenä on ollut myös vapauttaa palvelukauppaa. Vapaakauppasopimuksilla voidaan olettaa olevan talouspoliittista merkitystä erityisesti Suomen kaltaiselle pienelle avotaloudelle. Sopimusten taloudellisista vaikutuksista niin Suomessa kuin EU:ssakin on kuitenkin ollut saatavilla suhteellisen vähän systemaattista tietoa.

Vapaakauppasopimuksilla saattaa olla useita tavoitteita, mutta niiden päätarkoitus on kuitenkin helpottaa kauppaa, ja siksi sopimusten kauppavaikutusten empiirinen arviointi on ilmeisen tärkeä painopiste niiden tehokkuuden määrittämisessä. Kaupan edistäminen on tärkeä tavoite, koska lisääntynyt kauppa parantaa erikoistumisen ja kilpailun kautta tuottavuutta ja kasvua, alentaa hintoja sekä lisää kuluttajien vaihtoehtoja. Osa kansainvälisen kaupan tehokkuusvoitoista syntyy suhteellisen edun hyödyntämisestä, kansainvälisestä työnjaosta ja erikoistumisesta, ja osa syntyy skaalatuotoista, kun tuotantoa myydään suuremmille markkinoille kuin vain kotimaan markkinoille. Vaihdanta ja ulkomaiselle kilpailulle altistuminen johtavat myös yritysten väliseen valikoitumiseen, jossa tuottavimmat yritykset harjoittavat ulkomaankauppaa, vähemmän tuottavat yritykset myyvät vain kotimaan markkinoille ja heikoimmat yritykset lopettavat toimintansa kokonaan. Kaupan edistämä yritysten välinen valikoituminen kasvattaa talouden kokonaistuottavuutta. Kasvun ja tehokkuuden edistämisen lisäksi tutkimuskirjallisuus on osoittanut, että lisääntynyt kauppa saattaa johtaa myös korkeampiin palkkoihin, suurempaan tavaroiden ja palveluiden valikoimaan ja alhaisempiin hintoihin, teknologian leviämiseen ja lisääntyneeseen kilpailuun. Viime kädessä olemme kiinnostuneita siitä, lisäävätkö vapaakauppasopimukset kansalaisten hyvinvointia yllämainittujen eri kanavien kautta.

Tässä tutkimuksessa arvioimme vapaakauppasopimusten synnyttämän ulkomaankaupan kasvua ja tutkimme sopimusten vaikutuksia bruttokansantuotteeseen, arvonlisään, työllisyyteen ja suoriin sijoituksiin Suomessa. Vertailukohdaksi otamme vaikutukset muihin maihin. Tarkastelemme vaikutuksia sekä EU-tasolla kokonaisuutena että erikseen Suomen kannalta tärkeille Ruotsin ja Saksan talouksille.

Tutkimuksessa yhdistämme erilaisia menetelmiä. Päävälineenämme on kansainvälisen kaupan niin sanottu gravitaatiomalli, jonka avulla mittaamme sopimusten vaikutuksia eri maiden taloudelliseen kanssakäymiseen. Sopimukset voivat lähentää niihin kuuluvia maita muun muassa kaupalla ja suorilla sijoituksilla mitattuna. Arvioimme menetelmän eri muunnelmien avulla jo voimassa olevien vapaakauppasopimusten taloudellisia vaikutuksia ja ennakoimme niitä uusien vapaakauppasopimuksien osalta. Ennakollisessa arvioinnissa tarkastelussamme ovat erityisesti EU:n sopimukset Japanin, Singaporen, Vietnamin ja Meksikon kanssa.

Arvioimme lisäksi sopimusten vaikutuksia globaaleihin arvoketjuihin. Merkittävä osa tuotannosta on nykyisin hajautunut pitkiin toimitusketjuihin, joiden kautta sopimusten vaikutukset voivat ulottua laajasti talouteen eri maissa. Sopimusten piirissä oleva kauppa voi synnyttää arvonlisää niin kotimarkkinoiden tukipalveluissa kuin kolmansien maiden tuottamissa välituotteissakin. Tutkimuksessa yhdistämme sopimusten suorat vaikutusarviot maailmanlaajuiseen panos-tuotostaulukkoon ja analysoimme kaupan kokonaisarvoketjuvaikutuksia. Lisäksi tutkimme Etlan makrotaloudellista mallia hyödyntäen kaupan synnyttämiä kerrannaisvaikutuksia Suomen talouteen. Mallin avulla voimme mitata vapaakauppasopimusten synnyttämiä muutoksia esimerkiksi kulutus- ja investointikäyttäytymisessä, jotka tulisi huomioida kokonaisvaikutuksia arvioitaessa.

EU:n vapaakauppasopimukset

Tällä hetkellä EU:lla on voimassaolevia vapaakauppasopimuksia 72 maan kanssa, ja useiden uusien sopimusten neuvottelut ovat käynnissä. Suurin osa EU:n vapaakauppasopimuksista on solmittu kehittyvien talouksien kanssa. Joukossa on kuitenkin myös kehittyneitä maita, joiden nykyinen merkitys EU:n ulkokaupassa on tärkeämpi kuin kehittyvien maiden. Tämä johtuu sekä maantieteellisestä läheisyydestä (Sveitsi, Norja, Turkki) että suuresta taloudellisesta koosta (Kanada, Japani, Etelä-Korea, Meksiko). EU:lla ei ole vapaakauppasopimusta esimerkiksi Yhdysvaltojen, Kiinan, Venäjän tai Intian kanssa.

Jos lasketaan olemassa oleviin vapaakauppasopimuksiin mukaan tällä hetkellä allekirjoitusta vaille oleva sopimus Vietnamin kanssa, 42 prosenttia EU:n tavaraviennistä EU:n ulkopuolelle ja 37 prosenttia tavaratuonnista EU:n ulkopuolelta käytiin vapaakauppasopimuskumppaneiden kanssa vuonna 2016. Suomen osalta vastaavat luvut ovat 39 ja 26 prosenttia. Palvelukaupassa vapaakauppasopimuskumppaneiden osuus on hieman tätä alempi. Poikkeuksena on Suomen palvelutuonti, missä EU:n ulkopuoliset maat ovat tärkeämpiä kuin tavaratuonnissa Norjan suuren merkityksen vuoksi.

EU:n kauppasopimukset jakautuvat eri lajeihin. Tyypillisesti sopimukset jaotellaan kolmeen päälajiin: 1) tulliunioni, 2) assosiaatiosopimukset, vakautussopimukset, vapaakauppasopimukset ja taloudelliset kumppanuussopimukset sekä 3) kumppanuus- ja yhteistyösopimukset. Näistä viimeinen luokka ei kuitenkaan muuta ulkomaankaupan tulleja, joten niitä ei ole otettu huomioon tässä tutkimuksessa.

Eri sopimusten kattavuus ja taloudellisen integraation syvyys vaihtelee niiden tyypin mukaan. Suurin osa EU:n kauppasopimuksista on joko assosiaatiosopimuksia tai taloudellisia kumppanuussopimuksia. Tullioliittoja on tehty vain Andorran, San Marinon ja Turkin kanssa.

Tutkimuksessa on erikseen tarkasteltu Japanin, Singaporen ja Vietnamin kanssa vastasolmittuja vapaakauppasopimuksia sekä Meksikon kanssa syvennettyä aiempaa sopimusta. EU:n ja Suomen kauppa on 2000-luvulla kasvanut erityisesti Vietnamin ja Meksikon kanssa. Suhteellisen matalasta tulotasosta johtuen näillä mailla on hyvät kasvunäkymät, mikä mahdollistaa kaupan kasvun jatkumisen. Japani ja Singapore ovat puolestaan jo vauraita ja hyvin kehittyneitä talouksia. Niiden kanssa on yhtäältä potentiaalia palvelukaupassa sekä toisaalta joillakin aiemmin suojatuilla tavarakaupan ja investointien osa-alueilla.

EU:n vapaakauppasopimusten määrän lisääntyminen on osa yleismaailmallista ilmiötä. Toisen maailmansodan jälkeen pitkään menestyksekkäästi jatkunut tavarakaupan tullien alentaminen ensin GATT:in ja sitten WTO:n piirissä alkoi ajautua vaikeuksiin vuosisadan vaihteessa. Samoin palvelukauppaa vapauttamaan pyrkinyt GATS-sopimus ei edennyt odotetusti. Globaalin kehityksen korvasikin pyrkimys kahdenvälisiin kauppaa vapauttaviin sopimuksiin.

Kirjoitushetkellä voimassaolevia sopimuksia oli maailmanlaajuisesti 287, kun vielä esimerkiksi vuonna 1994 vastaava luku oli 37. Vaikkakin viimeaikainen protektionismin nousu Yhdysvaltojen presidentin Donald Trumpin toimien ja brexitin myötä on hidastanut kansainvälistymiskehitystä, on huomattava, että pitkällä aikavälillä maailmantalouden globalisaatio on edennyt nopeasti. Kahdenvälisten ja alueellisten vapaakauppasopimusten jatkuva lisääntyminen EU:n taloudellisten kilpailijoiden kesken on osaltaan lisännyt painetta myös EU:lle solmia uusia sopimuksia.

Vaikutuksia keskinäiskauppaan ja investointeihin

On tärkeää pitää mielessä, että ennen vuotta 1995 Suomi oli EU:n vapaakauppakumppanimaa EFTAn jäsenenä. Useat EU:n vapaakauppasopimukset ovat astuneet voimaan jo ennen Suomen EU-jäsenyyttä. Suomesta tuli voimassa olevien sopimusten osapuoli liittyessään EU:hun, mutta koska tässä tutkimuksessa emme pysty erottamaan liittymisvuonna olemassa olevien vapaakauppasopimusten vaikutusta Suomen EU-jäsenyyden vaikutuksista, keskitymme Suomen EU-jäsenyyden aikana, eli vuoden 1995 jälkeen solmittujen vapaakauppasopimusten ulkomaankauppavaikutusten analysointiin.

Tavarakauppa

Tavarakaupan osalta kansainväliset aineistot ovat nykyisin kattavia, ja siksi myös arviot sopimusten vaikutuksista tavarakauppaan ovat tarkempia kuin arviot vaikutuksista palvelukauppaan. Tarkastelemme tavarakauppaa kokonaisuutena käyttäen tuotetason tilastoja. Lisäksi erottelemme tavarakaupan tuotetason tilastot 23 alkutuotannon ja teollisuuden toimialaan.

Havaitsemme, että EU:n vapaakauppasopimuksilla ei ole ollut vaikutusta Suomen kokonaisvientiin. Suomen vienti on kasvanut merkittävästi moniin maihin, jotka ovat solmineet vapaakauppasopimuksia EU:n kanssa vuodesta 1996 lähtien, mutta kaupan kasvua vaikuttaa selittävän yleinen globalisaatiosta johtuva kaupan lisääntyminen pikemminkin kuin vapaakauppasopimukset. Tulosten mukaan vapaakauppasopimuksilla ei ole myöskään ollut vaikutusta Ruotsin tavaravientiin.

Keskimääräisen EU-vapaakauppavaikutuksen taustalla on varsin suurta toimialakohtaista vaihtelua. Sopimuksilla on ollut positiivinen vaikutus Suomen metsäteollisuuden tuotteiden vientiin sekä metalli- ja kemianteollisuuden vientiin. Tulos on kansainvälisen kaupan teorian ja tutkimustulosten mukainen, sillä nämä toimialat ovat niitä, joissa Suomella on kansainvälisessä kaupassa suhteellinen etu. Kaupan vapauttaminen tukee yleisesti maiden vahvoja suhteellisen edun toimialoja. Myönteisten kokonaisvientivaikutusten puuttuminen voi selittyä sillä, että joillakin toimialoilla EU:n vapaakauppasopimuksilla vaikuttaa olevan negatiivinen vaikutus vientiin, ja sillä että monet kumppanimaat, jotka ovat allekirjoittaneet vapaakauppasopimukset EU:n kanssa, eivät ole kokonaisuutena ottaen Suomelle tärkeitä vientikohteita.

Toisaalta havaintomme viittaavat siihen, että Suomen tuonti EU:n vapaakauppasopimusmaista on kokonaisuutena ottaen vähentynyt. Vaikutus on suhteellisen suuri, noin 23 prosenttia sopimusmaista tulevan tuonnin arvosta. Alakohtaiset vaikutukset ovat kuitenkin olleet tuonnissakin vaihtelevia. Negatiivinen

vaikutus on erityisen vahva muiden koneiden ja laitteiden, kumi- ja muovituotteiden, muiden ei-metallisten mineraalituotteiden sekä metallituotteiden valmistuksessa. Toisaalta EU:n vapaakauppasopimuksilla on ollut myönteisiä vaikutuksia Suomen tuontiin muiden kuljetusvälineiden kuin moottoriajoneuvojen, sähkölaitteiden, kemikaalien ja kemiallisten tuotteiden sekä lääkkeiden valmistuksessa.

Voi vaikuttaa yllättävältä, että EU:n vapaakauppasopimukset eivät ole lisänneet kokonaisuutena Suomen vientiä ja ovat vaikuttaneet tuontiin jopa negatiivisesti. Yksi mahdollinen selitys tuloksille Suomen kohdalla on EU:n laajentuminen kymmeneen Keski- ja Itä-Euroopan sekä Baltian maahan vuosina 2004 ja 2007. Merkittävän kaupan luomisen lisäksi vanhojen ja uusien EU-maiden välillä on jonkin verran todisteita myös rajoitetusta EU:n tuonnin uudelleen ohjautumisesta EU:n laajentumisen yhteydessä (ks. esim. Wilhemsson, 2006), mikä saattaa selittää negatiivisia vaikutuksia tuonnille. Itä-Euroopan maiden maantieteellinen läheisyys ja syvä integraatio EU:n kanssa saattoi merkitä sitä, että kauppa näiden maiden kanssa kasvoi voimakkaammin kuin kauppa maiden kanssa, jotka allekirjoittivat vapaakauppasopimuksia EU:n kanssa samana ajanjaksona.

EU:n tasolla havaintomme viittaavat siihen, että vuoden 1988 jälkeen voimaan tulleet vapaakauppasopimukset ovat lisänneet merkittävästi EU-maiden ulkomaankauppaa. Viennin osalta tulokset viittaavat siihen, että vaikutukset ovat varsin suuria. Esimerkiksi mahdollisimman kattava vapaakauppasopimus on lisännyt EU:n vientiä kumppanimaihin noin 34 prosenttia ja tuontia 14 prosenttia. On huomioitava, että EU-tasoiset suuremmat vaikutukset selittyvät ainakin osittain Suomen jäsenyyttä edeltäneiden sopimusten merkittävyydellä.

Kaiken kaikkiaan havainnot viittaavat siihen, että EU:n vapaakauppasopimukset ovat vaikuttaneet myönteisesti EU:n kauppataseeseen. On houkuttelevaa päätellä, että sopimuksista on ollut enemmän hyötyä EU-maille kuin sopimusmaille, koska ne ovat kasvattaneet EU-maiden vientiä enemmän kuin sopimusmaiden vientiä EU-maihin. On kuitenkin syytä huomioida, että EU:sta tulevalla tuonnilla on saattanut olla hyvinvointia lisääviä vaikutuksia sopimusmaissa, mikäli se on alentanut kulutushyödykkeiden hintoja ja lisännyt kilpailua ja tarjontaa. Lisäksi investointihyödykkeiden ja välituotteiden lisääntynyt tuonti on voinut parantaa tuottavuutta ja lisätä tuotantokapasiteettia ja kilpailukykyä kotimaisessa tuotannossa. Tämä on mahdollisesti tärkeää erityisesti keskituloisten ja kehittyvien maiden kannalta. Lopuksi on todettava, että vapaakauppasopimuksissa on tavarakaupan tullien lisäksi myös muita osioita, jotka voivat olla erityisen tärkeitä EU:n kumppanimaille.

Palvelukauppa

Palvelukaupan analyysissa on tavarakauppaan verrattuna vaikea löytää luotettavia tilastoja kauppavirroista eri maiden välillä. Olemme yhdistäneet tilastoja eri lähteistä mahdollisimman suuren kattavuuden saamiseksi, mutta tuloksia tarkasteltaessa on silti syytä muistaa, että aineistossamme on paljon puuttuvia havaintoja. Suuri osa EU:n kauppasopimuskumppaneista on pieniä ja kehittyviä talouksia, joiden vaikutuksia emme pysty tilastojen puutteellisuuden takia tarkasti arvioimaan. Tuloksemme painottavatkin suurempia kauppasopimuskumppaneita. Analysoimme tuloksia vain yleisesti EU-tasolla, sillä yksittäisten maiden kohdalla se ei datan vähyyden takia ole järkevää.

Palvelukaupan tuloksissa ei yleisellä tasolla havaita tilastollisesti merkitseviä vaikutuksia. Erottelemme EU:n ja Etelä-Korean välisen vapaakauppasopimuksen vaikutukset, sillä Etelä-Korean osalta on olemassa suhteessa enemmän palvelukauppatilastoja kuin monista muista maista, ja lisäksi tämä sopimus on kattava palveluiden osalta. Huomaammekin EU:n tuonnin kasvaneen Etelä-Koreasta sopimuksen seurauksena. Viennille emme havaitse tilastollisesti merkitseviä vaikutuksia. EU:n tulevat vapaakauppasopimukset esimerkiksi Singaporen kanssa ovat palveluiden osalta samanlaisia kuin Etelä-Korean kanssa, joten tulostemme pohjalta sopimuksilla on odotettavissa positiivisia vaikutuksia palvelukaupalle etenkin tuonnin osalta. Tähän vaikuttaa maiden suhteellinen etu palvelukaupan eri tuotteissa.

Otamme sekä tavara- että palvelukaupan analyysissa huomioon myös sen mahdollisuuden, että sopimuksilla voi olla vaikutuksia, jotka näkyvät vasta joitakin vuosia niiden voimaantulon jälkeen. Lisäksi huomioimme mahdolliset ennakointivaikutukset, jotka voivat lisätä kauppaa jo ennen sopimusten voimaantuloa, koska sitä tiedetään odottaa. Tavarakaupassa nämä tulokset eivät vaikuta suuresti johtopäätöksiimme. Palvelukaupassa kuitenkin havaitaan selkeä ennakointivaikutus sekä tuonnissa että viennissä ja negatiivinen vaikutus tuonnissa viiden vuoden jälkeen. Tämä viittaa siihen, että palvelukauppa on kasvanut ennakointivaikutusten takia jo ennen kauppasopimusten voimaantuloa ja palautunut myöhemmin lähemmäs aiempaa tasoa.

Uudet sopimukset Japanin, Singaporen, Vietnamin ja Meksikon kanssa

Tällä hetkellä voimassaolevien vapaakauppasopimusten vaikutusten arvioimisen lisäksi arvioimme neljän uuden sopimuksen vaikutuksia. Uudet sopimuskumppanimaat ovat Japani, Singapore ja Vietnam. Lisäksi Meksikon kanssa jo voimassaolevaa sopimusta päivitetään aiempaa kattavammaksi. Arvioimme vaikutuksia erikseen jokaiselle EU-maalle sekä näille kauppasopimusmaille viennin ja tuonnin prosentuaalisina muutoksina. Ennusteemme mukaan EU-maille suurin

vaikutus on sopimuksella Japanin kanssa. Suomen kohdalla odotettu kasvu on kokonaisviennissä 0,32 prosenttia ja kokonaistuonnissa 0,34 prosenttia. Kauppasopimusmaista odotettu kasvu on suurin Japanin ja Vietnamin kohdalla, noin 1,6-2,3 prosenttia sekä viennissä että tuonnissa. Myös Singapore on lähellä näitä lukuja. Meksikon osalta odotettu vaikutus on pieni, sillä muutos aiempaan sopimukseen ei ole suuri käyttämässämme muuttujassa, joka kuvaa kauppasopimuksen laajuutta.

Suorat sijoitukset

Tutkimme myös EU:n kauppasopimusten vaikutuksia EU:sta lähteviin ja sinne tuleviin suoriin investointeihin. Kuten palvelukaupan analyysissa, suorien investointien arvioinnissa tulokset esitellään vain EU-tasolla, sillä yksittäisten maiden kuten Suomen kohdalla tilastojen puutteellisuus aiheuttaa vaikeuksia luotettavassa analyysissa. Tulostemme mukaan EU:n vapaakauppasopimukset ovat kasvattaneet suoria investointeja EU:sta kumppanimaihin noin 35 prosenttia. EU:hun tulevien suorien investointien osalta tulokset viittaavat negatiivisiin vaikutuksiin. Tältä osin tulokset eivät kuitenkaan ole tarkkoja, sillä dataa on olemassa vähemmän tähän suuntaan.

Julkiset hankinnat

Viimeaikaiset EU:n kauppasopimukset ovat korostaneet julkisten hankintojen markkinoiden merkitystä, koska julkisilla hankinnoilla on suuri rooli useimpien maiden julkisissa menoissa. Julkiset hankinnat on jo sisällytetty moniin vanhempiinkin EU:n vapaakauppasopimuksiin. Tietojen puuttumisen vuoksi vapaakauppasopimuksen vaikutuksia julkisiin hankintoihin ei kuitenkaan voida analysoida systemaattisesti. Käytettävissä olevien tietojen perusteella näyttää siltä, että Suomen julkisten hankintojen markkinoita hallitsevat edelleen pääasiassa joko suomalaiset tytäryhtiöt tai yritykset, joilla on tytäryhtiö Suomessa. Emme havaitse että EU:n vapaakauppasopimukset olisivat (vielä) vaikuttaneet näihin markkinoihin. Samoin koko EU28-alueella muilla EU-mailla on hallitsevin rooli julkisten hankintojen markkinoilla. EU:n ulkopuolisten maiden osuus on kuitenkin kasvanut. Tämä voi johtua monista tekijöistä, mukaan lukien globalisaatiosta, mutta on myös mahdollista, että EU:n kauppasopimuksilla on ollut vaikutusta.

Arvoketju- ja arvonlisävaikutuksia

Osana hanketta arvioimme vapaakauppasopimusten vaikutuksia myös globaaleissa arvoketjuissa syntyvään suomalaiseen ja ulkomaiseen arvonlisään. Tarkastelu on tärkeää, koska globalisoituneessa maailmantaloudessa merkittävä osa viennissä syntyvästä arvonlisästä on sitoutuneena välillisiin kaupan virtoihin. Siten vapaakauppasopimusten kokonaisvaikutuksista voi saada epätäydellisen kuvan vain suoria bruttokaupan vaikutuksia arvioimalla.

Käyttämässämme menetelmässä yhdistetään aikaisemmat gravitaatiomallin tulokset vapaakauppasopimusten aiheuttamista toimialatason kauppavirtojen muutoksista maailmanlaajuisiin panos-tuotostaulukoihin. Tarkastelussa hyödynnämme suoraan vuoden 2004 jälkeisten sopimusten kauppavaikutuksia sekä arvioimme välillisesti aikaisempien sopimusten merkitystä uudempien sopimusten vaikutusarvioita hyödyntämällä.

Mallinnuksen avulla voidaan arvioida vapaakauppasopimusten vaikutuksia arvonlisään olettaen, että arvoketjurakenne säilyy muuttumattomana. Panos-tuotostaulukoita käytetään erottelemaan arvonlisäys kaikissa tuotantovaiheissa, joihin liittyy välillisesti tai välittömästi sopimuksen synnyttämiä kahdenvälisiä kauppavaikutuksia. Käytämme analyysissa maailman panos-tuotostietokannassa (WIOD) viimeisintä saatavilla olevaa vuotta 2014 ja edellä käytettyä toimialakohtaista tavarakaupan gravitaatiomallia.

Tuloksemme osoittavat, että vuoden 2004 jälkeen solmitut vapaakauppasopimukset ovat lisänneet Suomessa tuotettua kokonaisarvonlisäystä vuosittain noin 0,8 miljardia euroa. Määrä vastaa noin 1,6 prosenttia kaikesta tavaraviennin piirissä syntyvästä suomalaisesta arvonlisästä. Arviomme mukaan tuotanto edellyttää noin 10 000 työntekijän vuosityöpanosta Suomessa.

Kun vaikutusarviot laajennetaan koskemaan jo aiemmin solmittuja vapaakauppasopimuksia, arvonlisän lisäyksen määrä kasvaa lähes 1,7 miljardiin euroon (vuoden 2014 hinnoin) vuosittain, mikä on 3,6 prosenttia kaikesta viennin piirissä syntyvästä arvonlisästä vuosittain. Tämä vastaa 1,0 prosenttia Suomessa tuotetusta arvonlisäyksestä ja 0,8 prosenttia bruttokansantuotteesta. On huomattava, että lukuihin liittyy paljon tilastollista epävarmuutta, mutta tulokset antavat joka tapauksessa varsin hyvän kuvan arvonlisän mittaluokasta.

Analyysimme osoittaa lisäksi, että suuri osa arvonlisäyksestä on sitoutuneena tuotteisiin, joiden loppukokoonpanoa ei tehdä Suomessa. Suomalaisten lopputuotteiden tuotannossa syntyvä suomalainen arvonlisä on vain 19,7 prosenttia sopimusten synnyttämästä kokonaisarvonlisästä. Vuoden 2004 jälkeisten sopimusten

osalta suurimmat yksittäiset loppukokoonpanomaat Suomen ulkopuolella ovat Etelä-Korea, Kiina ja Yhdysvallat.

Toimialatason havainnot arvoketjuista osoittavat, että suomalaista arvonlisää syntyy eniten metsäsektorilla sekä erilaisten koneiden ja laitteiden valmistuksessa. Vaikka gravitaatiomallissa arvioidaan välittömiä vaikutuksia vain tavaravientiin, arvoketjuanalyysi osoittaa myös, että huomattava osa niiden tuotannon arvonlisästä syntyy Suomessa palvelualoilla: kaupassa, kuljetuksessa ja yrityspalveluissa. Lisäksi on huomattava, että kolmasosa Suomen kokonaisviennistä on palveluja, mitä ei ole tässä analyysissa voitu ottaa huomioon. Lisäys kokonaisarvonlisään on siksi todennäköisesti edellä mainittua suurempi.

EU:n vuoden 2004 jälkeen voimaan tulleiden vapaakauppasopimusten osalta kokonaisarvonlisävaikutus EU:n tasolla on noin 47,6 miljardia euroa vuositasolla (2,0 prosenttia EU:n viennin arvonlisästä). Vastaava luku on 137,6 miljardia euroa (3,0 prosenttia EU:n viennin arvonlisästä) EU:n kaikkien vapaakauppasopimusten osalta. Jälkimmäisessä luvussa tosin arvio perustuu uusien sopimusten vaikutusten yleistämiseen vanhoihin sopimuksiin. Vertailu osoittaa, että Suomen arvonlisävaikutukset ovat hieman EU:n keskiarvon alapuolella uusien sopimusten osalta, joista vaikutusarviot ovat kaikkein tarkimmat.

Sopimuksilla vaikuttaa olleen erityisen tärkeä merkitys EU:n uusille jäsenvaltioille, jotka ovat tulleet niiden piiriin liittyessään EU:hun[1]. Vaikutuksen taustalla on maiden toimialarakenteen keskittyminen erityisen vaikuttaville toimialoille ja toisaalta vapaakauppasopimusmaiden erityinen merkitys niiden ulkomaankaupassa. Toimialatasolla vapaakauppasopimuksen arvonlisävaikutus on ollut erityisen suuri kaivannaisteollisuudessa. Muita tärkeitä aloja ovat olleet moottoriajoneuvojen ja muiden kuljetusvälineiden valmistus, kauppa ja liike-elämän palvelut.

Kokonaistaloudellisia vaikutuksia

Arvioimme kauppasopimusten kokonaistaloudellisia vaikutuksia yhdistämällä gravitaatiomallin perusteella lasketut bruttoviennin lisäykset Suomen taloutta kuvaavaan Etlan makromalliin, joka huomioi keskeisten makromuuttujien väliset riippuvuudet. Teknisesti laskelma toteutettiin simuloimalla Etlan makromallilla muuttamalla vienti- ja tuontihintoja niin, että malli tuotti gravitaatiomallin tuloksia vastaavan lisäyksen Suomen bruttoviennissä.

[1] On huomionarvoista, että muille EU:n jäsenmaille käytämme yhteisiä gravitaatiomallin arvioita vapaakauppasopimusten toimialakohtaisista vaikutuksista kauppavirtoihin. Siten muiden maiden kuin Suomen osalta yksittäisten maiden vertailuissa on oltava varovainen.

Etlan makromallilla tehtyjen laskelmien perusteella EU:n tekemät vapaakauppasopimukset ovat nostaneet Suomen bruttokansantuotetta 0,1 – 0,4 prosenttia keskipitkällä aikavälillä. Bkt:n kasvu on ollut seurausta lisääntyneestä viennistä sekä 0,0 – 0,2 prosenttiyksikön osalta kasvaneesta yksityisestä kulutuksesta. Kauppasopimukset ovat myös nostaneet kotitalouksien käytettävissä olevia tuloja ja työn tuottavuutta 0,1 – 0,3 prosenttia. Viennin ja yksityisen kulutuksen kasvu on toisaalta nostanut tuontihyödykkeiden kysyntää, mikä selittää pienen vaikutuksen bruttokansantuotteeseen. Myös työllisyys on parantunut keskipitkällä aikavälillä 0,0 - 0,1 prosenttia, mutta pitkällä aikavälillä sopimusten synnyttämä lisäys bruttokansantuotteeseen on seurausta pelkästään työn tuottavuuden kohenemisesta.

Kokoavia päätelmiä tutkimuksesta

EU:n vapaakauppasopimusten vaikutuksista on tehty rajoitetusti aikaisempaa tutkimusta. Aikaisemmat analyysit ovat yleensä arvioineet sopimusten vaikutuksia pitkältä aikaväliltä, ulottuen ajanjaksoon, jolloin Suomi oli EEC:n vapaakauppasopimusmaa EFTA:n jäsenä. Osana EU:ta pystymme analysoimaan EU:n vapaakauppasopimusten vaikutuksia Suomelle vuodesta 1996 lähtien.

Havaitsemme tutkimuksen perusteella, että vapaakauppasopimuksilla on ollut positiivisia vaikutuksia EU:ssa, joskin Suomessa vaikutus on jäänyt keskimääräistä heikommaksi. Suomen vienti on kasvanut merkittävästi moniin maihin, jotka ovat solmineet vapaakauppasopimuksia EU:n kanssa vuodesta 1996 lähtien, mutta kaupan kasvua vaikuttaa selittävän yleinen globalisaatiosta johtuva kaupan lisääntyminen pikemminkin kuin vapaakauppasopimukset.

Vapaakauppasopimuksilla on ollut merkittävämpi vaikutus arvonlisäketjujen kautta Suomelle. Tavarakaupan osalta Suomessa vuoden 2004 jälkeen voimaan tulleiden vapaakauppasopimusten arvonlisävaikutuksen voi laskea olevan noin 1,6 prosenttia viennin kokonaisarvonlisästä, mikä on hieman EU:n keskiarvon (2,0 prosenttia) alapuolella.

Suomen keskiarvoa hieman vaimeampi vaikutus on ymmärrettävää, sillä useimmat sopimusmaat ovat olleet Suomelle vähemmän tärkeitä kauppakumppaneita. Samalla on todettava, ettei tulos kerro kaikista sopimuksen vaikutuksista. Ne vaikuttavat myönteisesti suoriin investointeihin ja palvelukauppaan, mutta niiden arvioihin liittyy enemmän epävarmuutta kansainvälisten aineistojen hajanaisuuden vuoksi.

Lisäksi on huomioitava, että analyysimme ei pysty arvioimaan, miten Suomi on hyötynyt EU:n vapaakauppasopimuksista, jotka olivat voimassa jo vuonna 1995 Suomen liittyessä EU:hun. EU:n sopimuksilla Baltian maiden kanssa on saattanut olla

jotain vaikutuksia Suomessa, mutta toisaalta merkittävät kauppavaikutukset syntyivät jo aikaisemmin kun Suomi solmi bilateraaliset vapaakauppasopimukset Baltian maiden kanssa 1992.[2] Emme myöskään pysty erottelemaan EU:n vuonna 1994 voimaan astuneen Euroopan talousalueen (EEA) merkitystä Suomelle, koska EEA:n jäsenmaat Islanti, Liechtenstein ja Norja olivat EFTA:n jäseniä Suomen, Ruotsin ja Itävällan rinnalla vuoteen 1994 asti. Etenkin EEA-sopimusmaa Norja on Suomelle tärkeä kauppakumppani, mutta maiden välistä kauppaa on edistänyt jo pitkään jatkunut integraatio EFTA:n puitteissa ennen EEA-sopimuksen voimaan astumista. Niinpä on vaikea arvioida, mikä merkitys EEA-sopimuksella on Suomen kaupankäynnille näiden maiden kanssa.

Vaikka vaikutukset kokonaisuudessaan ovat suhteellisen pieniä, EU:n vapaakauppasopimuksilla on ollut Suomessa erityisen merkittäviä positiivisia vaikutuksia joillakin toimialoilla. Merkittävimpiä hyötyjiä ovat olleet metsäteollisuus alihankintaketjuineen, kone- ja laitevalmistus sekä erilaiset tavarakauppaa tukevat liike-elämän palvelut.

EU:n tasolla havaintomme viittaavat siihen, että vuoden 1988 jälkeen voimaan tulleet vapaakauppasopimukset ovat lisänneet merkittävästi EU-maiden ulkomaankauppaa. Mahdollisimman kattava vapaakauppasopimus on lisännyt EU:n vientiä kumppanimaihin noin 34 prosenttia ja tuontia 14 prosenttia. On huomioitava, että EU-tasoiset suuremmat vaikutukset selittyvät ainakin osittain Suomen jäsenyyttä edeltäneiden sopimusten merkittävyydellä.

EU-tason vaikutukset viittaavat siihen, että vapaakauppasopimukset ovat kasvattaneet EU-maiden vientiä enemmän kuin sopimusmaiden vientiä EU-maihin. Tästä emme kuitenkaan voi päätellä että EU olisi hyötynyt kumppanimaita enemmän sopimuksista. EU:n viennillä on saattanut olla hyvinvointia kasvattavia vaikutuksia sopimusmaissa, mikäli se on lisännyt kilpailua, alentanut kulutushyödykkeiden hintoja ja lisännyt valikoimaa, parantanut tuottavuutta ja lisännyt tuotantokapasiteettia sopimusmaiden tuotannossa. Nämä mahdolliset vaikutukset ovat tärkeitä erityisesti keskituloisten ja kehittyvien maiden kannalta.

Kaiken kaikkiaan tuloksemme antavat tukea vapaakauppasopimusten käytölle talouspolitiikan välineenä. Havainto on erityisen tärkeä aikana, jolloin sopimusten poliittinen rooli on muutenkin korostunut. Alueellisten kauppasopimusten suosio on kasvanut 2000-luvulta lähtien WTO:n Dohan kierroksen neuvotteluiden

[2] Kauppa kasvoi voimmakaasti näiden sopimusten puitteissa, etenkin Viron kanssa. Suomen markkinaosuudet vuonna 1991 olivat vielä 2,3 % Viron viennistä ja 2,0 % tuonnista, kun ne vuotta myöhemmin olivat kasvaneet 21,2 % ja 22,6 %:iin.

epäonnistuttua. Kun WTO:n kehittäminen maailmankaupan edistäjänä vaikeutui, kannustimet muiden järjestelyiden luomiseen kasvoivat.

Yhdysvaltojen täyskäännös maailman vapaakaupan edistäjästä sen kritisoijaksi viime vuosina on jättänyt EU:lle aiempaa tärkeämmän roolin vapaakauppapolitiikan linjan jatkuvuuden takaajana ja vastavoimana maailmantaloudessa muuten vaikuttavalle protektionistiselle liikehdinnälle. EU:n lisäksi myös Japani, Australia, Kanada ja monet muut maat ovat ilmaisseet haluavansa harjoittaa vapaata kauppaa ja kehittää sopimusjärjestelmiä.

Vaikka vapaakauppasopimukset edesauttavat vapaata kansainvälistä kauppaa, niiden toteutustavat ja muut kansainväliset instituutiot ovat keskeisiä vaikutusten suuruuden kannalta. Aikaisempi kirjallisuus osoittaa, että syvimmin taloudellisen yhteistyön vapauttamista ohjaavat sopimukset synnyttävät myös suurimmat vaikutukset kauppaan. Laajatkaan sopimukset eivät kuitenkaan täysin pysty korvaamaan WTO:n maailmankaupan suhteisiin tuomaa läpinäkyvyyttä, ennustettavuutta ja riitojenratkaisumekanismia. Siksi EU:n tulisi pyrkiä, paitsi uusiin ja laajoihin vapaakauppasopimuksiin, myös tukemaan WTO:n uudistusten jatkamista ja takaamaan sen toimintakyky myös tulevaisuudessa.

1 Introduction

The European Union (EU) builds on economic policies that encourage open and predictable trade and market access to economies around the world with the aim of increasing the welfare of its citizens. Free trade agreements (FTA) between EU and non-EU countries are essential tools in the implementation of this goal, and they are a necessary response to the continuous increase in bilateral and regional FTAs among the EU's economic competitors. FTAs may have many objectives, but their main purpose is to facilitate trade. Therefore, the focus of this study is the empirical evaluation of their effects on trade.

The aim of improving open market access is important because trade liberalization and increased trade promote productivity and growth through specialization and competition, lower prices and increase consumer choice. International trade and exposure to foreign competition also lead to selection among heterogeneous firms, with the most profitable firms trading abroad and growing larger, the less profitable firms selling only to the domestic market, and the weakest firms going out of business. Trade-driven selection between firms increases overall productivity in an economy. In addition to promoting growth and efficiency, research literature has shown that increased trade may also lead to higher wages, a wider range of goods and services and lower prices, technology diffusion, and increased competition. Ultimately, we are interested in FTAs increase the well-being of citizens through the various channels mentioned above.

The global increase in the number of trade agreements has been rapid. Currently, 287 regional trade agreements (RTA) are in force compared with only 37 in 1994. Until the early 2010s, most RTAs were signed with minor economies. However, recently, even large economies such as the EU, Japan and the United States have negotiated RTAs with each other.[3] The negotiations between the EU and Japan resulted in a new FTA, but the negotiations between the EU and the United States ceased without a conclusion regarding the Transatlantic Trade and Investment Partnership at the end of 2016.

The EU, including Finland, currently has free trade agreements with 70 countries, and it is now negotiating new FTAs with several countries. Some of the most recent

[3] The rules of the World Trade Organization (WTO), founded in 1995, allow these trade agreements even though they can interfere with the most favoured nation (MFN) principle. Indeed, RTAs between major economies were represented the final erosion of the MFN clause.

agreements already in force are with Japan (2019), Ukraine (2017), South Korea (2015), Canada (2017) and Singapore (2019). A new trade agreement has already been signed with Vietnam (2019), but its provisional application is still pending. In addition, the European Commission has recently ended negotiations on the renewal of the existing FTA with Mexico, and it is currently negotiating new FTAs with several parties, such as Mercosur, Indonesia, Australia and New Zeeland.

Despite the importance and growing number of the EU's FTAs, there have been surprisingly few systematic assessments of their economic effects. Much of the previous literature has evaluated the trade effects of RTAs except for the EU's FTAs. Regarding already completed agreements and agreements currently under negotiation, the effects on the EU have been evaluated mainly in ex-ante assessments because the EU legislation requires an initial assessment of the effects of each trade treaty before negotiations are begun. However, few previous studies conducted ex-post evaluations of the economic impact of the EU's Free Trade Agreements. Therefore, the present study is aimed to fill this gap in the knowledge by providing a comprehensive ex-post analysis of the effects of the EU's existing FTAs on imports and exports, gross domestic product (GDP), employment and foreign direct investment (FDI), focusing on Finland. In addition, this study provides an ex-ante analysis of the trade effects of the most recently negotiated new FTAs with Japan, Singapore and Vietnam as well as the renewed FTA with Mexico.

Evaluating the effects of FTAs is important for several reasons. First, the EU member countries devote substantial amount of resources in negotiating and implementing FTAs. Second, the FTAs are expected to have a significant impact on the contracting parties by increasing trade and by generating welfare gains for the contracting parties, but the actual outcome could be negligible or even negative. For instance, in the cases when an FTA substitutes for a full implementation of the the World Trade Organisation (WTO) rules, or when an FTA diverts trade from other trading partners rather than creates new trade between the contracting parties. Third, in times of increasing protectionism and demands to renew the WTO, FTAs are increasingly important and therefore it is important to understand their economic impact.

2 Aim and Scope of the Study

The aim of the study is to evaluate the economic impacts of the EU FTAs on Finland. The analysis focuses on the impact of FTAs on foreign trade, but also evaluates the effects on trade in value added, FDI and GDP in Finland. We compare the impacts on trade in Finland to Sweden and Germany, which are the two most important trading partners of Finland within the EU, and to the EU as a whole.

We estimate the economic impact of the EU FTAs in several stages. First, we use a so-called 'gravity model to assess both ex-post and ex-ante impact of the EU's FTAs on bilateral trade, trade between third countries, and real GDP. The gravity model, which is the workhorse of empirical trade analysis, is presented more in detail in Chapter 5 and in the Appendix. We analyse the effect of FTAs separately on goods and services trade. We focus on the evaluation of the economic impact of the existing trade agreements, and the four new FTAs with Japan, Singapore, Vietnam and Mexico, of which the three first ones are new and the last one an improvement in terms of coverage of the existing FTA with Mexico. We also examine the effect of FTAs on bilateral inward and outward foreign direct investment (FDI) between the EU and the FTA partner countries.Second, we use the estimated FTA effects on trade obtained from the gravity model together with the World Input-Output Database (WIOD) to assess the impact of FTAs on the value-added content of trade. Third, using the estimated effects on gross exports as inputs we employ Elinkeinoelämän tutkimuslaitos (ETLA) macroeconomic model to simulate the effects of the FTAs on the Finnish economy (see Lehmus, 2018).

We first provide an overview of the previous literature and the EU FTAs in chapters 3 and 4. The analysis of the FTA effects on trade, FDI, trade in value added and the Finnish economy are presented in chapters 5 to 8. Finally, we conclude in chapter 9.

3 Previous Studies

During the last 10–15 years, there has been significant progress in estimating the trade effects of regional trade agreements by using the gravity estimation model. Most previous studies estimated either the average effects of RTAs in general or the effect of a particular RTA. Other studies evaluated the effects of individual trade agreements.

In the present study, we do not aim to provide a comprehensive review of previous studies on the effects of RTAs and FTAs. Instead, we focus on studies published in academic journals, which analysed the effects of FTAs and RTAs according to the type of agreement as well as studies on the EU FTAs.[4] According to the relevant literature, there are large differences between different types of RTAs, which is important in understanding the expected effects of the EU's FTAs. Few previous studies evaluated the effects of the EU FTAs, and most were focused on only one or a small number of individual agreements. Moreover, because these studies were usually reports that were commissioned by the EU or a particular government, they were not published in peer-reviewed academic journals.

Several studies estimating the overall average effect of FTAs/RTAs find that an FTA approximately more than doubles the bilateral trade in goods between members of an agreement over a period of ten years. (see e.g. Baier and Bergstrand, 2007 and 2009; Egger et al., 2011; Anderson and Yotov, 2016; and WTO, 2016). The impact of RTAs on trade in services is less than half their impact (8-32 per cent) on trade in goods (see e.g Guillin, 2013; Lamprecht and Miroudot, 2018). The reason is probably that RTA commitments for services rarely remove the applied barriers to trade in services. Instead, service commitments reduce trade policy uncertainty which is expected to have a positive impact on service trade. As for trade in goods, deeper commitments and broader sector coverage lead to stronger trade effects. For instance, for the EU, trade in services has increased by 36-45 per cent between members (see e.g Guillin, 2013). Not surprisingly, agreements without service provisions have no statistically significant effects on trade in services.

Since this study focuses on the EU's FTAs, it is important to understand that the average effects of RTAs hide a large variation in the effects depending on the depth and scope of the RTA. Most studies, distinguishing the type of FTA, find that the

[4] For a comprehensive review of studies that analysed the overall effect, see National Board of Trade Sweden (2018).

deeper the agreement, the larger are the trade effects. Baier, Bergstrand and Feng (2014) show that “deeper” agreements, i.e. customs unions, common markets and economic unions have larger effects on trade than FTAs, and that FTAs have larger effects than other preferential trade agreements (whether reciprocal or non-reciprocal).

Magee (2008) estimates both the average effect of RTAs and the effect of different types of RTAs. He finds that bilateral trade flows increase by on average 89 per cent ten years or longer after the agreement comes into effect, but custom unions have a considerably larger impact on trade than FTAs. Customs unions (CUs) increase trade by 129 per cent, whereas FTAs increase it by 66 per cent over the time period up to 18 years after the agreement comes into effect. Furthermore, CUs appear to have stronger long-term effects; after six years the CU impact keeps rising, whereas the FTA impact levels off. Roy (2010) also finds that customs unions have a much larger impact than FTAs on trade. The difference is a 31 per cent increase for FTAs versus a 136 per cent increase for customs unions over ten years.

Kohl and Trojanowskaja (2015) also find that the trade effects grow with the depth of integration. The shallowest agreements, non-reciprocal preferential trade agreements, only have a small effect (+ 8 per cent), followed by reciprocal preferential trade agreements (+62 per cent) and free trade agreements (+109 per cent). Customs unions, common markets and economic unions have the strongest impact on trade between members (+250 per cent). The estimates of Limău (2016) follow a similar pattern; non-reciprocal preferential trade agreements have no statictically significant effect, the FTAs increase trade by 70 per cent and customs unions, common markets and economic unions increase it by 219 per cent.

A study by Anderson and Yotov (2016) contrasts to the other reviewed studies since they find no stronger effects for free trade agreements and customs unions, which they define as “deep integration agreements” as compared to other “shallow integration” agreements. Baier, Bergstrand, Egger, and McLaughlin (2008) estimate the total effect of RTAs after excluding the EU, EFTA and the European Economic Area (EEA), which are expected to have a larger impact than other less deep RTAs, but still find a trade effect of other RTAs to be quite high, 80–115 per cent, depending on the estimation approach over a ten-year phase-in period.

Anderson and Yotov (2016) show that the trade effects of RTAs are stronger when initial trade barriers are high. This is important to keep in mind when evaluating the effects of the EU’s FTAs. Many partner countries already face low import barriers to the EU market before joining the FTA, and therefore, we should expect smaller effects on imports.

Although several of above reviewed studies have estimated the effects for FTAs separately, they have not distinguished the effects for the FTAs of the EU. They only indicate an average total effect of FTAs in the world. The study by Soete and Van Hove (2017) is one of the few studies that estimate the effects of EU trade agreements with several other economies and is published in an academic journal. They find that EU trade agreements classified as customs unions and common markets increase trade by 77 per cent over ten years. Further, their results indicate that EU's FTAs increase trade between members by 42 per cent over the same time-period, while EU preferential trade agreements (category 1 and 2 RTAs according to the WTO classification) increase trade by 21 per cent.

Some non-academic reports evaluated the effects of EU trade agreements and included more than one agreement in the evaluation. Bergstrand, Baier, Sunesen and Thelle of Copenhagen Economics (2011) evaluated six FTAs that had been in force for approximately ten years in 2011: South Africa (1999), Mexico (2000), Morocco (2000), Tunisia (1998), Chile (2003) and Jordan (2002). Copenhagen Economics presented evidence that EU exports to Chile, Tunisia, and Morocco show increase as a result of the FTAs. The latter two FTAs increase EU exports by 80 per cent, and EU exports to Chile appear to more than double as a result of the FTA. Their results suggest also that EU imports from Chile and Mexico increased by 50-90 per cent as a result of the FTAs. They also find that imports from South Africa, Tunisia, and Morocco did not increase as expected due to EU's low effective trade-weighted imports tariffs initially and small tariff reductions from the FTA. There was also no statistically significant impact of FTAs on EU exports to Mexico and on EU imports from South Africa. Only one their priors is not confirmed; they expected the EU exports to South Africa to increase due to the FTA, but estimations did not confirm a statistically significant increase.

Oomes, Appelman, Rougoor, Smits and Witteman of SEO Amsterdam Economics (2016) published a non-peer reviewed report on the EU's FTAs. The authors evaluated bilateral FTAs that the European Commission was negotiating or considering negotiating at the time of the report between the EU and six of its trading partners: Australia, Chile, Indonesia, Mexico, New Zealand and the Philippines. The report was focused on the effects of FTAs on the Dutch economy. They used a gravity model with traditional gravity variables as control variables. the findings showed that all six envisaged FTAs would lead to a substantial increase in Dutch exports to these countries. The largest effect on Dutch exports was found in the potential FTAs with Australia and Indonesia.

The National Board of Trade Sweden (2019) conducted a comprehensive analysis of the effects of EU regional trade agreements. They used data on period 1962–2017 and included Finland, Sweden and Austria as EU FTA partners in the European Free Trade Association (EFTA) agreement before they joined EU in 1995 and as EU countries since 1995. The findings showed that the EU's FTAs increased trade between the EU and the partner country by an average of 48 per cent. These results suggested that deeper FTA agreements, such as customs unions and single-market integration agreements (EU–Turkey, EEA etc.), generated the largest effects on trade. However, the results also suggested that pre-2010 FTAs (including EFTA) had stimulated trade more than the post-2010 FTAs did. Specifically, the findings showed that that the 1973 EU–EFTA had strong effects on Austria, Sweden, Finland and Iceland (62–96 per cent) and medium effects on Portugal, Switzerland and Norway (36–49 percent). The authors concluded that the effects of the EFTA on trade did not correspond to expectations based only on the level of ambition because the association was limited to industrial goods and tariffs.

Finally, it should be noted that the expected effects of the EU's FTAs were dependent on the existing RTAs and other trade policies that prevailed before the treaties come into force. For instance, many developing countries already enjoyed low tariffs on their exports to the EU market thanks to the Generalised Scheme of Preferences (GSP) before entering into an FTA with the EU. Therefore, the agreement may not have involved as large a change in the trade flows to the EU as in the trade flows from the EU. Moreover, it should be considered that existing EU FTAs also evolve over time. For instance, the former members of the EFTA members, Austria, Denmark, Finland, Portugal, Sweden and the United Kingdom all joined the EC/EU at different times. The remaining members of the EFTA—Iceland, Lichtenstein, Norway and Switzerland—have deepened their integration in the European Economic Area (EEA). Furthermore, the United Kingdom is currently negotiating to leave the common market. It is important to also consider the fact that Finland shifted from being a partner country with a free trade agreement with the EU to a member country of the EU in 1995, which limits the period and the set of agreements of which the effects can be estimated for this country.

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4 An overview of EU Free Trade Agreements

In this section, we include the EU's FTAs and describe their key features, focusing on the most recent and influential. We concentrate on goods trade-related issues in the FTAs because most of our analyses were conducted using these data. Furthermore, we provide descriptive statistics on the associated trade flows.

4.1 Structure and content of EU FTAs

The EU has trade agreements with 66 countries and territories throughout the world.[5] This number includes the EU–Japan Economic Partnership Agreement, which was entered into force in February 2019. In addition, the EU has concluded FTA agreements with several countries. These agreements are currently awaiting the signatures of all parties. Furthermore, the EU is conducting ongoing FTA negotiations with several more countries.

The European Commission lists three main types of agreements and their goals regarding tariffs:

i) **Customs Unions**
   a. eliminate customs duties in bilateral trade
   b. establish a joint customs tariff for foreign importers

ii) **Association Agreements, Stabilisation Agreements, (Deep and Comprehensive) Free Trade Agreements and Economic Partnership Agreements**
   c. remove or reduce customs duties in bilateral trade
   d. the type of agreement depends on the country/region and how close the ties are with the EU (e.g. potential EU members, special historical ties)
   e. Economic Partnership Agreements can include asymmetric tariff reductions. For example, the EPA with the SADC countries removes all tariffs from their exports to the EU but still keeps them in place for some imports from the EU.

[5] See https://ec.europa.eu/trade/policy/countries-and-regions/negotiations-and-agreements/

iii) Partnership and Cooperation Agreements

f. provide a general framework for bilateral economic relations
g. leave customs tariffs as they are

In addition to tariff reductions, trade agreements are also aimed to facilitate trade by including clauses regarding several areas, such as non-tariff barriers, investment, intellectual property rights, government procurement and technical standards. The tariffs on manufactured goods are already very low, especially between industrialised countries. The exceptions are agricultural produce, foodstuffs and beverages, clothing, textiles and footwear, all of which in many cases are still subjected to relatively high tariffs.

The liberalisation of service trade is also often included, especially in new agreements. The depth of agreement varies based on their type. Most EU trade agreements are either association agreements or economic partnership agreements. Customs unions have been made with only Andorra, San Marino and Turkey. Because the third category, partnership and cooperation agreements, does not include tariff reductions, we exclude it from our discussion and analysis.

Most current EU trade agreements have been signed with developing or emerging countries, such as the Central American region of Costa Rica, Guatemala, Honduras, Nicaragua, Panama and El Salvador. Before their trade agreements, these developing countries had participated in a scheme called the GSP, which removed import duties from products entering the EU market from vulnerable developing countries. Consequently, the EU's duties on imports from these countries were already low or non-existent before the FTAs came into force.

The new trade agreements were aimed to lower tariffs bilaterally as well as deepen cooperation and enforce rules in several areas, such as investment, which was discussed above. However, the transition periods of tariff reductions are often long. For example, the agreement with Cameroon, which was ratified in 2014, was to gradually remove duties and quotas over 15 years on 80 per cent of EU exports to that country. Therefore, it will take some time for the effects of such trade agreements to appear in the trade statistics.

Table 4.1.1 shows the EU's FTA partner countries or country groups in the order of the year in which the agreement came into force. When new European countries joined the EU, they also became partners in the existing EU trade agreements. The table does not include agreements that are no longer in force (e.g., the EU free trade agreements with former EFTA countries Austria, Finland and Sweden) or European agreements between the EU15 countries and Central and Eastern European countries that have since become EU members. The table shows the share of partner

countries or country group in the extra-EU goods trade in the EU28 and Finland in 2016. The total share of the partner countries was 35 per cent in extra-EU goods exports and 29 per cent in imports. The respective figures for Finland were 32 per cent and 21 per cent. It should be noted that intra-EU trade is not included here. Consequently, the FTA partner countries were somewhat less important than the EU28 on average in extra-EU trade by Finland. The most important FTA partners of both the EU28 and Finland are Switzerland, Turkey, Japan, Norway, South Korea, Canada and Mexico.

Table 4.1.1 FTA partner countries of the EU and their share in EU and Finnish extra-EU goods trade in 2016, %

Partner country/organization	FTA In force since	Share in exports, %		Share in imports, %		GSP[1] before FTA
		EU28	Finland	EU28	Finland	
Switzerland	1973	8.12	3.64	6.86	3.16	
Andorra	1991	0.00	0.00	0.00	0.01	
San Marino	1991	0.00	0.00	0.00	0.00	
Iceland	1994	0.16	0.21	0.14	0.06	
Norway	1994	2.47	6.71	3.50	5.36	
Liechtenstein [2]	1995	..	..	..	..	
Turkey	1996	4.23	3.61	3.94	2.30	
Faroe Islands	1997	0.00	0.00	0.04	0.00	
Palestinian authority	1997	0.04	0.01	0.00	0.00	
Tunisia	1998	0.56	0.25	0.56	0.06	x
Israel	2000	1.49	1.00	0.65	0.43	
Morocco	2000	1.26	0.80	0.82	0.09	x
Mexico	2000	2.31	1.73	1.23	1.04	x
South Africa	2000	1.26	1.27	1.30	0.70	x
Jordan	2002	0.25	0.13	0.02	0.00	x
Egypt	2004	1.03	1.61	0.39	0.10	x
North Macedonia	2004	0.23	0.03	0.24	0.02	x
Chile	2005	0.55	1.02	0.42	0.68	x
Algeria	2005	1.23	0.87	0.93	0.00	x
Lebanon	2006	0.41	0.16	0.02	0.00	x
Cariforum [3]	2008	0.20	0.04	0.19	0.05	x
Albania	2009	0.16	0.04	0.08	0.00	x
Montenegro	2010	0.06	0.02	0.01	0.00	
South Korea	2011	2.83	3.52	2.55	2.64	
Papua New Guinea and Fiji	2011	0.00	0.00	0.04	0.00	x
Eastern and Southern Africa [4]	2012	0.12	0.06	0.15	0.09	x
Colombia and Peru	2013	0.58	0.75	0.64	0.83	x
Central America [5]	2013	0.30	0.17	0.36	0.53	x
Serbia	2013	0.66	0.32	0.49	0.11	
Cameroon	2014	0.09	0.06	0.10	0.00	x
Georgia	2014	0.12	0.05	0.03	0.01	x
Moldova	2014	0.11	0.05	0.08	0.01	x
Bosnia and Herzegovina	2015	0.31	0.03	0.20	0.02	x
Côte d'Ivoire	2016	0.00	0.00	0.28	0.01	x
Ghana	2016	0.19	0.10	0.13	0.00	x

Ukraine	2016	0.94	0.83	0.76	0.25	x
SADC [6]	2016	0.05	0.09	0.21	0.62	x
Canada	2017	2.51	2.47	1.67	2.16	
Ecuador	2017	0.10	0.08	0.17	0.09	x
Mozambique	2018	0.06	0.36	0.08	0.04	x
Total		34.99	32.09	29.28	21.47	
Japan	2019	4.10	5.34	4.58	3.38	
Singapore	2019	2.09	1.10	1.18	0.49	
Vietnam (awaiting signature and conclusion)		0.61	0.86	2.18	1.09	
Grand Total		41.79	39.39	37.22	26.43	

[1] GSP: Generalised Scheme of Preferences.
[2] Comtrade database does not have goods trade data for Liechtenstein.
[3] Cariforum: Antigua and Barbuda, Bahamas, Belize, Barbados, Dominica, Dominican Republic, Grenada, Guyana, Jamaica, Saint Kitts and Nevis, Saint Lucia, Surinam, Trinidad and Tobago, and Saint Vincent and the Grenadines.
[4] Eastern and Southern Africa: Madagascar, Mauritius, Seychelles, and Zimbabwe.
[5] Central America: Costa Rica, Guatemala, Honduras, Nicaragua, Panama, and El Salvador.
[6] SADC (Southern African Development Community): Botswana, Lesotho, Namibia, and Eswatini (Swaziland).

Japan, Singapore and Vietnam are listed at the bottom of Table 4.1.1. The agreements with Japan and Singapore were entered into force in 2019. The FTA agreement with Vietnam has been signed, and it is now waiting ratification. Singapore and Vietnam are important partners in EU exports and imports, respectively. The EU's trade with Japan, Mexico, Singapore and Vietnam is discussed in detail in the next section. When we included these three countries, the share of the FTA partners increased to 42 per cent in extra-EU exports and to 37 per cent in extra-EU imports. The respective figures for Finland were 39 per cent and 26 per cent.

Table 4.1.2 shows the share of the partner countries of the EU and Finland in the extra EU services trade. The grand totals, including Japan, Singapore and Vietnam, were relatively close to the respective percentages in the goods trade discussed above: in the EU aggregate, 40 per cent in extra-EU exports and 33 per cent in imports; in Finland, 30 per cent in extra-EU exports and 33 per cent in imports.

Overall, the most important partner countries in the services trade are Switzerland, Japan, Norway, Singapore, Turkey, Australia, Brazil and Canada. As expected, the important partners are relatively large economies and/or developed economies that are geographically close to the EU. This finding is in line with the gravity theorem. Norway is relatively more important in Finland in extra-EU services and imports than in the aggregate EU.

Table 4.1.2 FTA partner countries of the EU and their share in the EU and Finnish extra-EU services trade in 2016, %

Partner country/organization	FTA In force since	Share in extra-EU exports		Share in extra-EU imports	
		EU	Finland	EU	Finland
Switzerland	1973	15.56	7.73	11.17	7.00
Andorra	1991	0.04	0.01	0.04	0.01
San Marino	1991	0.02	0.00	0.01	0.00
Iceland	1994	0.25	0.10	0.29	0.37
Norway	1994	3.89	4.58	2.63	7.74
Liechtenstein	1995	0.12	0.01	0.07	0.01
Turkey	1996	1.68	1.26	2.33	2.33
Faroe Islands	1997	0.02	0.00	0.01	0.00
Palestinian authority	1997	0.01	0.00	0.00	0.00
Tunisia	1998	0.06	0.14	0.32	0.07
Israel	2000	0.24	0.05	0.48	0.36
Morocco	2000	0.53	0.37	0.85	0.32
Mexico	2000	1.41	1.12	0.68	1.08
South Africa	2000	1.10	0.58	0.68	0.72
Jordan	2002	0.11	0.04	0.06	0.02
Egypt	2004	0.56	0.40	0.57	0.24
North Macedonia	2004	0.17	0.01	0.09	0.01
Chile	2005	0.12	0.60	0.22	0.44
Algeria	2005	0.36	0.15	0.18	0.00
Lebanon	2006	0.13	0.11	0.15	0.02
Cariforum [1)]	2008	0.40	0.34	0.52	0.15
Albania	2009	0.09	0.07	0.12	0.00
Montenegro	2010	0.02	0.00	0.03	0.00
South Korea	2011	0.31	0.00	1.21	0.95
Papua New Guinea and Fiji	2011	0.05	0.00	0.02	0.00
Eastern and Southern Africa [2)]	2012	0.25	0.04	0.33	0.21
Columbia and Peru	2013	0.39	0.95	0.20	1.09
Central America [3)]	2013	0.42	1.18	0.39	1.42
Serbia	2013	0.35	0.06	0.29	0.04
Cameroon	2014	0.07	0.24	0.05	0.12
Georgia	2014	0.04	0.03	0.04	0.00
Moldova	2014	0.06	0.01	0.12	0.00
Bosnia and Herzegovina	2015	0.14	0.04	0.16	0.02
Côte d'Ivoire	2016	0.11	0.08	0.09	0.00
Ghana	2016	0.13	0.04	0.08	0.00
Ukraine	2016	0.64	0.22	0.36	0.15
SADC [4)]	2016	0.08	0.00	0.05	0.11
Canada	2017	2.29	0.89	1.46	1.73
Ecuador	2017	0.09	0.05	0.04	0.02
Mozambique	2018	0.07	0.03	0.02	0.02
Total		32.38	21.53	26.41	26.77
Japan	2019	4.55	5.35	3.10	3.15
Singapore	2019	3.11	2.29	2.83	2.62
Vietnam		0.25	0.69	0.21	0.62
Grand Total		40.29	29.86	32.55	33.16

[1] Cariforum: Antigua and Barbuda, Bahamas, Belize, Barbados, Dominica, Dominican Republic, Grenada, Guyana, Jamaica, Saint Kitts and Nevis, Saint Lucia, Surinam, Trinidad and Tobago, and Saint Vincent and the Grenadines.
[2] Eastern and Southern Africa: Madagascar, Mauritius, Seychelles, and Zimbabwe.
[3] Central America: Costa Rica, Guatemala, Honduras, Nicaragua, Panama, and El Salvador.
[4] SADC (Southern African Development Community): Botswana, Lesotho, Namibia, and Eswatini (Swaziland).

4.2 The recent FTAs with Japan, Singapore, Vietnam, and Mexico

The EU has recently finalised negotiations for new trade agreements with Japan, Singapore and Vietnam. The agreements with Japan and Singapore were entered into force on 1 February 2019 and 21 November 2019, respectively. The agreement with Vietnam is currently being ratified. In addition, the earlier agreement with Mexico, which was entered into force in 2000, is in the final stages of an update.

Table 4.2.1 Depth of the recent RTAs

Core provisions	Japan	Singapore	Vietnam	Mexico before	Mexico now	South Korea
Tariffs industrial	x	x	x	x	x	x
Tariffs agriculture	x	x	x	x	x	x
Customs administration	x	x	x	x	x	x
Export taxes	x	x	x	x	x	x
Anti-dumping	x	x	x	x	x	x
Competition policy	x	x	x	x	x	x
TBT (technical barriers to trade)	x	x	x	x	x	x
SPS (sanitary and phytosanitary standards)	x	x	x	x	x	x
State aid	x	x	x		x	x
GATS (liberalization of trade in services)	x	x	x	x	x	x
CVM (countervailing measures)	x	x	x	x	x	x
TRIPS (trade-related aspects of intellectual property rights)	x	x	x	x	x	x
Public procurement	x	x	x	x	x	x
Investment	x	x	x	x	x	x
Movement of capital	x	x	x	x	x	x
STE (state trading enterprises)	x	x	x		x	x
IPR (intellectual property rights)	x	x	x	x	x	x
TRIMS (trade related investment) measures	x	x	x		x	

Source: Hofmann, Claudia; Osnago, Alberto; Ruta, Michele. 2017. Horizontal depth: a new database on the content of preferential trade agreements (English). Policy Research working paper; no. WPS 7981. Washington, D.C.: World Bank Group.
http://documents.worldbank.org/curated/en/700771487791538589/Horizontal-depth-a-new-database-on-the-content-of-preferential-trade-agreements

All these new trade agreements are comprehensive (i.e., “deep”) in the provisions that they cover. In our econometric analysis, we used an index ranging from 0 to 1 to describe the depth of all trade agreements. The index values of the EU’s new agreements are usually close to the maximum number (see Hofmann, Osnago and Ruta, 2017).

Table 4.2.1 shows the 18 different provisions included in the index. South Korea is included in the table as a reference country because its agreement went further than any previous agreement in lifting trade barriers, and it was the EU's first trade deal with an Asian country. The EU–South Korea FTA was provisionally applied from July 2011, and it was formally ratified in December 2015.

The new agreements with three Asian countries include Trade Related Investment Measures (TRIMS), which are even more extensive than the agreement with South Korea. TRIMS are rules used in the domestic regulations that a country applies to foreign investors. In 1995, a general TRIMS agreement was entered into force as part of the WTO.

Although the new agreements have similar content and coverage, there are some differences among them. In the following sections, we describe important features of each agreement. Additional discussion can be found on the European Commission’s website on trade (http://ec.europa.eu/trade/policy/countries-and-regions/negotiations-and-agreements/).

4.2.1 Japan

Japan is the EU’s second-biggest trading partner in Asia after China (and the seventh largest overall), but many trade barriers to its markets have remained. The new Economic Partnership Agreement with Japan is aimed to remove these barriers and provide comprehensive guidelines for trade liberalisation. For example, almost all custom duties to an annual maximum of one billion euros will be removed.

According to the WTO, the simple average MFN tariff applied to Japan’s imports was 4.4 per cent in 2018. It was much higher, at 15.7 per cent, for agricultural products. The new tariff reductions allow around 85 per cent of EU agri-food products (measured according to tariff lines) to enter Japan duty free. The average Japanese MFN tariff on non-agricultural products is just 2.5 per cent, and the tariffs on textiles, clothing and footwear raise the average considerably. Note that trade-weighted average tariffs are lower than these simple averages.

The agreement also resolves non-tariff measures, as some Japanese technical requirements differ from European requirements. Non-tariff measures are often much more important barriers to trade between industrialised countries than the currently low remaining tariffs are. According to the agreement, trade in services is also liberalised, particularly in financial services, e-commerce, telecommunications and transport.

Government procurement has not liberalised greatly beyond Agreement on Government Procurement (GPA) standards. However, the agreement gives EU companies access to the procurement markets of 54 large Japanese cities, and it removes obstacles to procurement in the economically important railway sector at the national level.

4.2.2 Vietnam

The EU and Vietnam signed an FTA on 30 June 2019, and it is now waiting ratification by all parties. The EU's main exports to Vietnam are high-tech products, including electrical machinery and equipment, aircraft, vehicles, and pharmaceuticals, while the main imports by the EU are telephone sets, electronic products, footwear, textiles and clothing, coffee, rice, seafood and furniture. As we discuss in the next section, trade between the EU and Vietnam has increased rapidly.

Previously, Vietnam participated in the Standard GSP programme, which meant the partial or full removal of customs duties on two-thirds of tariff lines on imports entering the EU. The new trade agreement will remove most of the remaining tariffs from EU exports as well. The goal is to eliminate 99 per cent of all tariffs in a maximum transition period of 7–10 years.

According to the WTO, the simple average MFN tariff applied by Vietnam was 9.5 per cent in 2018, while the trade-weighted average was 5.2 per cent. High tariffs are placed on agricultural products, textiles and clothing as well as on imported metal industry products (especially transport equipment). Minerals and petroleum currently have considerable tariffs of up to 20 per cent.

In addition to tariff elimination, an important part of the agreement is to open new service and public procurement markets. Other goals include ensuring the protection of geographical indications, reducing regulatory barriers and the amount of overlapping red tape.

4.2.3 Singapore

Singapore is the EU's largest trading partner in the Association of Southeast Asian Nations (ASEAN). The FTA that the EU negotiated with Singapore is similar to the one with Vietnam. The trade agreement is expected to remove almost all custom duties in a maximum transition period of five years as well as eliminate overlapping bureaucracy. According to WTO data, however, Singapore does not charge tariffs on its imports with the exception of a limited number of beverages and tobacco products. Services are very important in the economies of both the EU and Singapore. The agreement covers a wide range of services and provides additional market access for providers of services. Moreover, Singapore and the EU have agreed to apply the same rules and regulations to domestic and foreign providers of services in certain sectors. In government procurement, both the EU and Singapore will go beyond the GPA. For example, they agreed to extend GPA procurement requirements to all public contracts covered under the agreement.

4.2.4 Mexico

An association agreement has been in force between the EU and Mexico since 2000, but it is now being updated to the broader, modernised EU–Mexico Global Agreement. Compared with the previous agreement, the modernised version will liberalise trade by removing almost all tariffs. The remaining tariffs, mainly on food and beverages, will be removed after the maximum transition period of seven years. Trade in services will also become more predictable, and foreign service providers will receive the same treatment as national ones do. Public procurement in Mexico was included only at the federal level in the previous agreement, but the federal government now has now agreed to negotiate with Mexican states to allow EU firms to tender contracts with them by the time the agreement is signed. In addition, EU firms will be allowed to tender more contracts with Mexico’s federal government.

4.3 EU and Finnish trade with Japan, Singapore, Vietnam, and Mexico

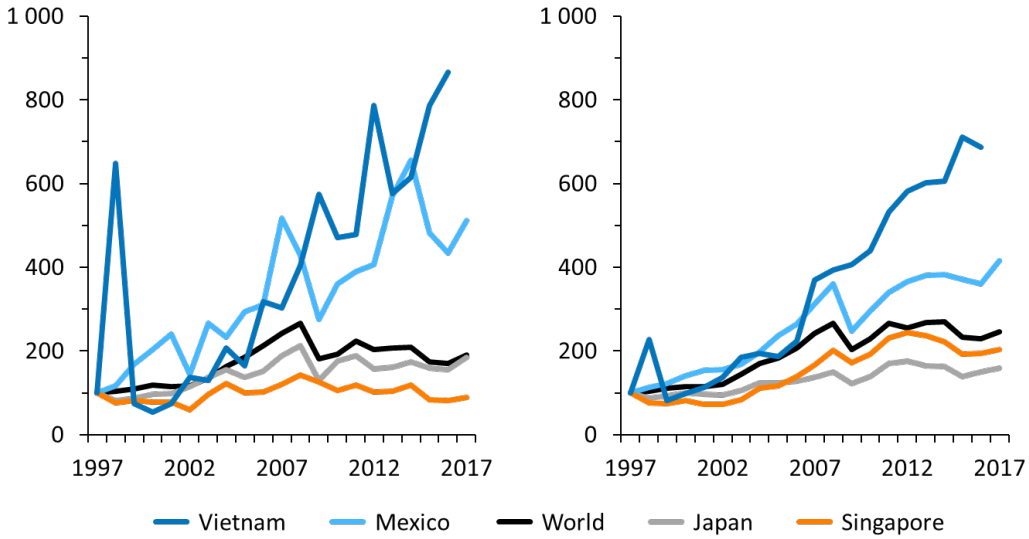
The recent EU FTAs with Japan, Singapore and Vietnam as well as the new deeper FTA with Mexico decrease trade costs between these trading partners. We now examine the development of trade between the EU and Finland and these Asian countries during the past two decades. We use the EU15 as the comparison because the EU28 includes countries that were not EU members during the entire period.

As shown in Figure 4.3.1, after 1997, the value of goods exports from both Finland (left graph) and the EU15 (right graph) increased faster in trade with Vietnam and Mexico than with Japan, Singapore and the world. This is not surprising because Vietnam and Mexico are emerging economies, and the former in particular was previously closed to world markets. Therefore, there has been much room for trade growth. Moreover, Vietnam is now emerging as a manufacturing power base because China has become too expensive for many producers.

Although the global trade in goods increased rapidly until the financial crisis in 2008, since then growth has been subdued. Exports to Japan and Singapore have continued to lag similar to the total EU exports. However, EU exports to Vietnam and Mexico continued to increase after 2008. Finnish exports to Vietnam, Mexico and Japan have increased faster than the EU15 exports to these countries have. However, EU15 total exports and exports to Singapore have surpassed Finnish exports to that city-state.

Although they are not shown in the presented graphs, the total world exports, not only to Vietnam but also to Japan and Singapore, increased faster than the EU15 exports to these countries from 1997–2017. Vietnam's GDP has increased rapidly, which has supported the increase in imports to that country. Furthermore, the increase in Vietnamese exports led to increased imports because of the country's participation in global value chains. In contrast, EU15 exports to Mexico have increased more quickly than the total world exports from that country have.

Figure 4.3.1 Value of goods exports from Finland (left) and the EU15 countries (right) to selected countries and the world, 1997 = 100

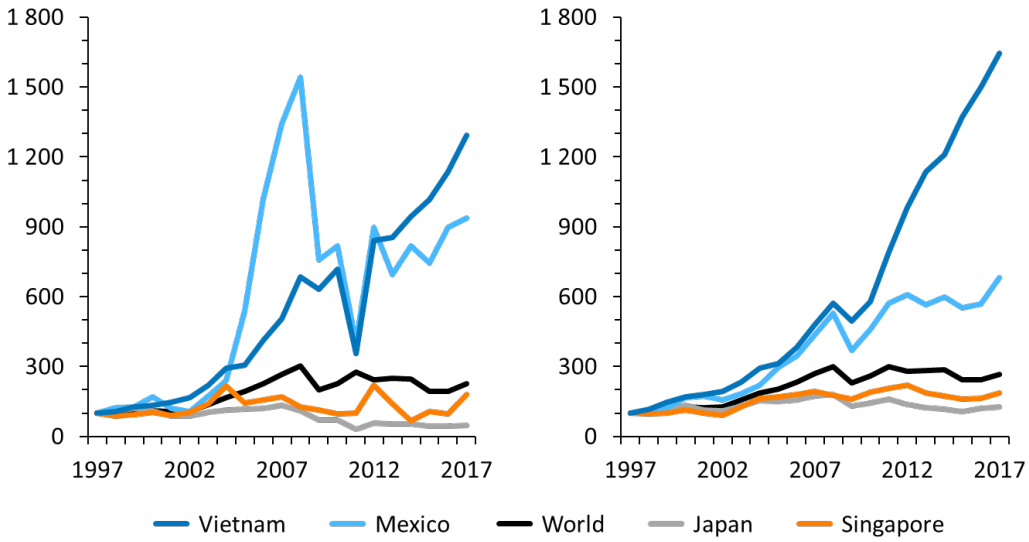


Source: UN Comtrade statistics.

Figure 4.3.2 shows the values of goods imports from the four countries to Finland (left graph) and the EU15 (right graph). The figure shows a steady, strong increase in trade with Vietnam and Mexico, especially the former. The total EU15 and Finnish imports have increased faster than the imports from either Japan or Singapore, which coincides with the overall stronger growth in imports than in exports across all countries. In the case of Japan, a probable reason for this development is the outsourcing of Japanese production first to China and later to Vietnam, and other countries, which shows in Figure 4.3.2 as an increase in imports from these countries at the expense of imports from Japan.

Finland exports goods to Japan, and to a lesser degree the EU15 also exports goods to that country, which has increased more rapidly than imports from Japan have. The reason is that China became the world's largest exporter of manufactured products. In contrast, Finnish exports to Mexico, Singapore and Vietnam have been completely outperformed by Finnish imports from these countries. The same is true for the EU15 in the case of trade with Mexico and Vietnam. Exports from the EU15 to Singapore have grown faster than the imports from that city-state have.

Figure 4.3.2 Value of imports to Finland (left) and the EU15 countries (right) from selected countries and the world, 1997 = 100



Source: UN Comtrade statistics.

4.4 Finnish trade with Canada, Egypt, South Korea, and Turkey

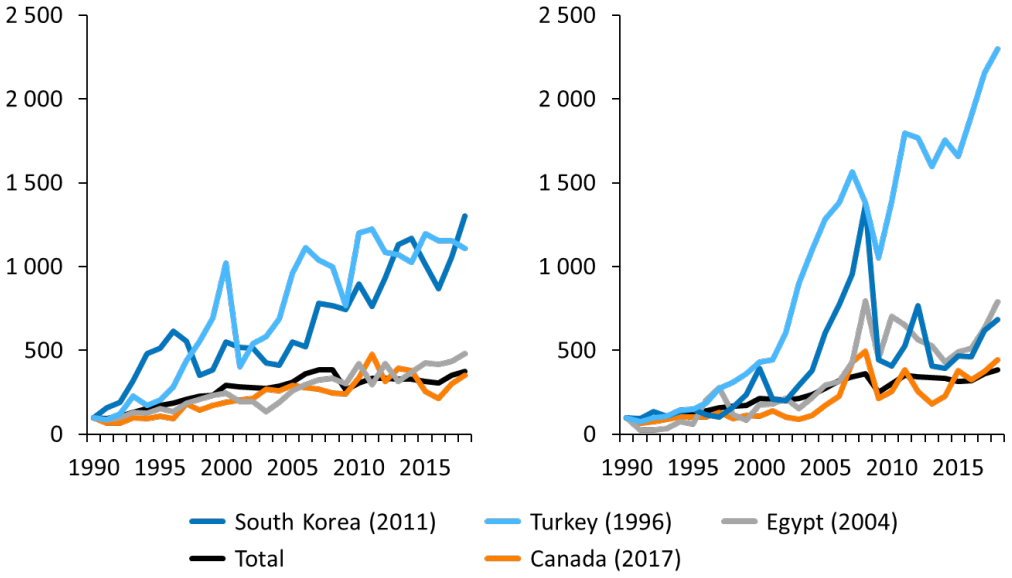
Figure 4.3.3 shows the development of Finnish trade with other important FTA partner countries. We included Canada, Egypt, South Korea, and Turkey. After 1995, FTAs were entered into force with all these countries, as shown in parentheses beside the names of the countries shown in the graphs.

The values of goods exports to South Korea and Turkey have grown not only steadily but also more quickly than either the total exports or exports to Egypt and Canada have. Because the FTA with Canada is recent, we may expect that its effect is not yet apparent. Moreover, other factors are not considered in these graphs, such as the development of local purchasing power and competition in the export market. However, these factors were controlled for in the econometric analysis performed in this study.

Imports from Turkey increased rapidly and much more quickly than the total imports or imports from the other three countries. We may tentatively argue that the trade agreement has contributed to an increase in trade. Before the financial crisis, there was a peak in imports from South Korea. However, these imports have not recovered

from their collapse in the beginning of the financial crisis. This lack of recovery may be due to a relocation of production and thereby an increase in imports from elsewhere.

Figure 4.3.3 Value of Finnish goods exports to (left graph) and imports from (right graph) a selection of important FTA partner countries (year when FTA entered into force shown in parentheses), 1990 = 100



Source: Finnish Customs.

4.5 FTAs and public procurement

Recent EU trade agreements emphasised the importance of public procurement markets, as it plays a large role in the public spending of most countries. Public procurement expenditures represent about one-third of the total government expenditures in OECD countries. In 2015, government procurement expenditures, as measured in national accounts, were approximately 13 per cent and 17 percent of the GDP in the OECD average and in Finland, respectively. However, the data on public procurements are limited. The EU uses the online system Tenders Electronic Daily (TED)[6] to post public procurement notices, which include available data on contract winners. Direct cross-border procurement is identified based on the winner's country. However, the identification of indirect cross-border contracts in which a foreign

[6] See https://ted.europa.eu/TED/misc/aboutTed.do

company has a subsidiary in another country is more difficult because the firm ownership of the winning bidder needs to be determined using other methods. There is no database on public procurement outside the EU. Because of the lack of data, the systematic analysis of the effects of FTAs on public procurement is not possible. In this section, we use the available information to provide overviews of the inclusion of public procurement in the EU's trade agreements and the openness of Finnish public procurement markets.

The WTO established a plurilateral agreement called the Agreement on Government Procurement (GPA), which was aimed to open government procurement markets among its parties. Currently, there are 19 parties to the agreement, including the EU. However, the GPA has some limitations. For example, it does not include the sectors and levels of government or the value thresholds of projects. In addition, many countries have not joined the agreement, including most of the EU's FTA partners. The EU has therefore decided to include public procurement in many bilateral FTAs. For example, the EU–Canada Comprehensive Economic and Trade Agreement (CETA) states that EU and Canadian businesses can provide goods and services to each other at every level of government (i.e., national, regional and provincial, and local), albeit with some restrictions. In contrast, for example, the new EU–Japan Economic Partnership Agreement is more limited regarding shared public procurement markets. This agreement gives companies access to the procurement markets of 54 large Japanese cities and removes obstacles to procurement in the railway sector at the national level.

Public procurement was included in many existing EU FTAs. For example, the bilateral agreement with Switzerland (2002) grants access to the procurement of goods, works and services, and the old agreement with Mexico (2000) included the parties' commitment to the gradual and mutual opening of government procurement markets (European Commission, 2009). In 2006, the European Commission created a new policy framework for a new generation of FTAs that was focused strongly on areas not yet covered by multilateral WTO rules, such as public procurement (European Commission, 2009). Most FTAs that were enforced after this time include provisions on public procurement although there are some exceptions. For example, according to the European Commission's documentation, the agreement with Eastern and Southern Africa (ESA) countries (i.e., Comoros, Madagascar, Mauritius, the Seychelles and Zimbabwe) is focused on trade in goods and does not include public procurement provisions. The agreement with ESA is an interim Economic Partnership Agreement, which can be limited in reciprocity and coverage than other types of trade agreements are. In most cases, public procurement is included in recent agreements.

In Finland, most public procurement is undertaken by either Finnish companies or foreign companies that have subsidiaries in Finland. According to a report by the European Commission, in direct cross-border procurement (where the successful bidder is not located in the same country as the contracting authority and is not domestically owned), the other EU countries are predominant in the entire EU28 area. Table 4.5.1 shows that the EU's share of direct cross-border public procurement awards was over 70 per cent from 2009–2015. Nevertheless, as shown in the table, there has been a downward trend: the share of non-EU awards has been increasing. This trend could be due to several factors, including globalisation; moreover, the effect of EU's trade agreements is a possible influence.

Table 4.5.1 Breakdown of country of winner for direct cross-border awards between the EU and the non-EU countries, 2009 to 2015

Year	Number of direct cross-border contracts awarded to firms located in the EU28	Number of direct cross-border contracts awarded to firms located outside the EU28	EU share in the total number of direct cross-border awards, %	Value of direct cross-border contracts awarded to firms located in the EU28 (EUR million)	Value of direct cross-border contracts awarded to firms located outside the EU28 (EUR million)	EU share in the total value of direct cross-border awards, %
2009	4,743	685	87.4	2,944	545	84.4
2010	5,436	773	87.6	2,964	506	85.4
2011	5,696	1,155	83.1	3,514	577	85.9
2012	5,601	1,256	81.7	3,139	827	79.1
2013	6,030	2,431	71.3	3,564	1,174	75.2
2014	6,694	2,436	73.3	3,565	1,345	72.6
2015	7,074	2,533	73.6	3,779	1,381	73.2
Total	41,274	11,269	78.6	23,469	6,356	78.7

Source: European Commission (2017), London Economics based on TED transactions and Orbis database.

To study Finnish public procurement markets, we used the TED data on public procurement awards. The data are first listed based on tender ID, and the tenders are divided into multiple lots. In many cases, only the amount of the total tender is listed, and it is not possible to determine how it is divided per lot. Table 4.5.2 shows the number of lots awarded by Finland to different countries between 2009 and 2018. As the table shows, most awards were given to Finnish bidders. However, these could have included subsidiaries of foreign companies. The number of direct cross-border awards was small in comparison to those won by Finnish entities. The only FTA partners of Finland that won lots during these years were Norway, Iceland, Switzerland and South Korea, but they were few.

Table 4.5.2 The number of Finnish public procurement lots awarded to different countries in 2009–2018

Country	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	Total
Finland	6,020	4,848	4,208	3,724	3,934	3,347	4,030	7,230	9,470	9,137	55,948
Belgium	0	0	0	0	1	0	0	0	0	0	1
Germany	1	0	0	0	1	1	2	1	2	0	8
Denmark	1	0	2	2	2	1	0	0	0	0	8
Estonia	1	2	1	0	1	2	0	0	0	0	7
France	0	1	0	0	0	0	0	0	2	1	4
Greece	0	0	0	0	0	1	0	0	0	0	1
Hungary	0	0	0	1	0	0	0	0	0	0	1
Ireland	1	0	0	0	1	0	0	0	0	0	2
Italy	0	0	1	0	0	1	0	0	0	0	2
Lithuania	0	0	0	0	1	0	0	0	0	0	1
Luxembourg	0	0	0	0	1	0	0	0	0	0	1
Latvia	1	0	0	0	1	0	0	0	0	0	2
Netherlands	0	0	1	0	1	0	0	0	1	1	4
Poland	0	0	0	0	1	1	0	0	0	0	2
Portugal	0	0	0	0	1	1	0	0	0	0	2
Spain	0	1	0	0	0	0	0	0	0	0	1
Sweden	2	0	3	1	5	2	0	0	0	1	14
UK	0	0	0	4	4	3	1	16	8	2	38
Iceland	0	0	6	0	0	0	0	0	0	0	6
Israel	0	0	0	0	1	0	0	0	0	1	2
Norway	0	0	0	0	2	1	0	0	0	2	5
Russia	0	0	0	0	2	0	0	0	0	0	2
South Korea	0	0	0	0	1	0	0	0	0	0	1
Switzerland	0	0	0	0	0	0	1	0	0	0	1
USA	0	0	0	3	1	2	5	6	25	7	49
Total	6,027	4,853	4,222	3,736	3,962	3,363	4,039	7,253	9,508	9,152	56,115

Although the data are limited, the available information indicates that Finland's public procurement markets are still mainly governed by either Finnish entities or foreign companies that have a subsidiary in Finland. Therefore, the EU's FTAs do not yet impact these markets.

4.6 Summary

The EU has trade agreements with 72 countries and is in ongoing negotiations with many more. These agreements fall broadly into three categories: 1) customs unions; 2) association agreements, stabilisation agreements, free trade agreements and economic partnership agreements; 3) partnership and cooperation agreements. Because the third category does not include tariff reductions, they were not analysed in this study.

The EU has recently concluded FTAs with Japan, Singapore and Vietnam, and it has updated an old association agreement with Mexico. These “deep” FTAs address a wide range of issues that extend beyond mere tariff cuts.

Including the four recently concluded FTAs, almost 42 per cent of extra-EU goods exports are to countries with which the EU has a trade agreement. About 37 per cent of extra-EU goods imports originate in these countries. The most important current FTA partner countries of both the EU28 and Finland are Switzerland, Turkey, Japan, Norway, South Korea, Canada and Mexico. In the services trade, the share of FTA extra-EU partner countries is a little lower but relatively close to the figures in the goods trade. The most important partner countries in the services trade are Switzerland, Japan, Norway, Singapore, Turkey, Australia, Brazil and Canada.

EU trade has developed rapidly, especially with Mexico, South Korea, Turkey and Vietnam. Of these, Mexico and Vietnam have good economic growth prospects based on their economic “catching-up”, which also supports the potential growth in their trade with the EU. In comparison, because Japan and Singapore have more developed economies, there is growth potential, especially in the services trade and in certain previously sheltered goods trade sectors.

In addition to the goods and services trade across countries, FTAs are aimed to promote the liberalisation of public procurement markets, especially recent EU trade agreements. However, there are no available data on EU companies participating in foreign public procurement markets, which makes analyzing the impact of FTAs difficult. In the EU, most public procurement projects are still undertaken by EU entities. In Finland, most projects have been awarded to entities that are listed as Finnish. That is, they are either Finnish or they have a subsidiary in Finland. Nevertheless, there has been a trend toward extra-EU participation in the EU’s public procurement markets, and the FTAs are a tool that can be used to continue this trend.

5 Trade effects of EU FTAs

5.1 Gravity model

The objective of this study is to conduct a gravity analysis to isolate the trade effects of EU FTAs from other determinants of international trade. The gravity model is the main tool used to evaluate the effects of changes in the variables that affect barriers to trade between countries, such as FTAs (see e.g., Anderson and Yotov, 2010; Anderson and Van Wincoop, 2003; Helpman, Melitz, and Rubinstein, 2008; Egger and Larch, 2011; Head and Mayer, 2014; Brakman, Kohl, and Van Marrewijk, 2015; Bekkers and Rojas-Romagosa, 2018).[7]

The gravity model is based on the gravity theory in physics. In the latter, any two objects have a gravitational pull that depends positively on the product of their masses and negatively on the distance between them. In economics, the gravitational pull that explains trade or investment depends on country-specific and pair-specific variables, such as the GDP and the distance between two trading partners. Short distances and close ties tend to increase trade, while long-distance trade barriers increase transportation and other trade costs, thereby reducing trade In addition to distance, other variables such as, a common border, language or religion, and an earlier colonial relationship, have been included in the traditional gravity model to capture other trade costs.

In this study, we consider a structural gravity model (i.e., canonical; Anderson and Van Wincoop, 2003). One of the main advantages of the structural gravity model is that it delivers a tractable framework for trade policy analysis in a multi-country environment. Key in modern formulations of the gravity models are the so-called multilateral resistance (MLR) terms. These terms are related to price indices, which are important in analysing the effects of an FTA between the EU and another country in the rest of the trading system. Without these terms, the simulated effects of an FTA would only affect the countries involved. However, when these price index terms are included, an FTA changes the MLR terms and thus affects the entire trading system because trade between any pair of countries takes place against the background of changed price indices.

We estimated the effect of EU FTAs on both the goods trade and the services trade. In the estimation, two different sets of fixed effects (dummy variables) were

[7] See Larch and Yotov, 2016, note 37 for a list of recent studies.

substituted for the above-mentioned traditional gravity variables. The first set of fixed effects—directional (exporter and importer) fixed effects—account for multilateral resistance terms. It should be noted that in addition to accounting for the unobservable multilateral resistance terms, the exporter-time and importer-time fixed effects will also absorb the country size variables from the structural gravity model as well as all other observable and unobservable country-specific characteristics, which vary across these dimensions, including various national policies, institutions and exchange rates.

The second set of fixed effects, which are country pair-specific, provide a comprehensive account of the effects of all time-invariant bilateral factors, such as distance, a common language or a colonial history affects trade flows. These pair fixed effects have also been shown to carry systematic information about trade costs in addition to the information captured by the standard gravity variables (Egger and Nigai, 2015; Agnosteva et al., 2014). Another benefit of pair fixed effects is that they can account for the endogeneity of trade policy variables (Baier and Bergstrand, 2007). Our main estimation model included directional and pair fixed effects. The gravity model and the estimation models are presented in detail in the Appendix.

In applying the gravity model, we assessed both the ex-post effects of the existing trade agreements, and the ex-ante effects of the following FTAs, which are not yet in force: agreements with Japan, Singapore, Vietnam and Mexico. In ex-post analyses of trade agreement effects, a partial equilibrium gravity model is applied, which includes only the direct effects of the agreements on the two agreement parties and have no implications for the trade and welfare of other countries (Larch and Yotov, 2016). This direct effect is the initial and likely the strongest effect of trade liberalisation on bilateral trade (Larch and Yotov, 2016). However, if we wanted to predict the effects of a future trade agreement, we would need to construct a counterfactual model that shows how trade costs would change if the trade agreement were enforced. For this purpose, we used a general equilibrium model that allowed for changes in multilateral resistances and adjustments in the prices and output of all economies. The general equilibrium model is explained in detail in Appendix A1. We first found the direct effects of the EU’s trade agreements as in previous analyses and estimated the trade costs between each country pair. Then we constructed a new hypothetical trade agreement and studied the degree to which the trade costs changed. These trade costs were then used to predict the impact of the trade agreement on trade flows.

5.2 Data and variables

The analysis required reliable and extensive data. We used the UN Commodity Trade Statistics Database (COMTRADE), which contains bilateral trade flow data on aggregate and specific levels in different classifications, such as the harmonised system (HS). The COMTRADE data are available from 1962 and cover most countries in the world although the number of records was lower in earlier years of the data period. The trade values are reported in gross numbers, and current US dollars are converted from national currencies. In the analysis of the aggregated level of country trade, we used the years 1988–2017, as most of the EU's current free trade agreements were entered into force in this period. In focusing on the trade agreement effects on Finland, we used the years 1995–2017 because Finland has been a member of the EU during this period.

In addition to trade between different countries, we included intra-national trade in the aggregate level of manufacturing. The inclusion of intra-national trade data in structural gravity estimations is recommended for several reasons (Yotov, Piermartini, Monteiro and Larch, 2016). Yotov et al. (2016) listed these reasons as follows: 1) including intra-national trade allows consumers to choose from and consume domestic as well as foreign goods; 2) it leads to theoretically consistent estimations of the impacts of bilateral trade policies; 3) it also allows for the identification and estimation of the effects of non-discriminatory trade policies; 4) it resolves the "distance puzzle" in trade by measuring the effects of distance on international trade relative to the effects of distance on internal trade; and 5) it captures the effects of globalisation on international trade and corrects for biases in the estimation of the impact of trade agreements on trade (Yotov et al., 2016).

In constructing intra-trade data, we used the difference between total gross production and exports of each country in each year. For gross production, we used the UNIDO INDSTAT2 database. The countries' total exports were calculated using COMTRADE data. In this aggregate level analysis, we used data on 92 countries to have as few missing observations as possible of the intra-trade data. We used the same data to study the ex-ante effects of new trade agreements.

In the sector-level analysis, we aggregated product data at the HS Nomenclature 6-digit level to the industry classification ISIC Rev. 4 (i.e., NACE Rev. 2). We used data in the period from 2002–2016 because from 2002 onwards, we could easily translate the HS six-digit codes to industry codes by using available translation keys without causing a major break in the classifications. Throughout the analysis, we used the countries' import data because it they have generally been judged to be more reliable than export data. There were 131 countries in the sector-level trade analysis. The

countries included in both the aggregate and sector-level analyses are listed in Appendix A2.

Merchandise trade flows have generally been reported with a high level of accuracy in most countries, but in services trade, the situation is more challenging. The trade in goods is recorded by the customs offices in each country, but because of the intangible nature of services, the collection of service trade data requires different methods. For example, Eurostat uses the transactions recorded under a country's balance of payments, which captures all transactions that take place between an economy's residents and non-residents.[8] In many countries, services data are based on surveys. However, in these data, the quality of service is much weaker and less accurate and time coverage than in the data on goods trade, which is especially true in developing countries.

To ensure that the data were as reliable as possible, we limited the analysis of service trade flows to the period 2000–2017 only at the aggregated country level. We also combined multiple sources and mirrored exports to imports when the latter data did not exist for a county pair. We first used data from the OECD (i.e., trade in services by partner country) and then combined them with the WTO-UNCTAD-ITC annual trade in services dataset. We also use Eurostat and COMTRADE service trade data when they were applicable. The data from Eurostat were converted from euros to US dollars by using the annual conversion rates set by the European Central Bank. These sources report similar numbers when data exist on the same countries; therefore, we combined them to construct a dataset that had as much coverage as possible.

The OECD and WTO have jointly constructed a dataset called OECD-WTO Balanced Trade in Services, which includes 191 economies from 1995–2012 with as few gaps as possible. In their methodology, they first use their existing data and combine it with other data (e.g., Eurostat). They then apply different extrapolations and predictions to fill the gaps. One of their methods for constructing missing data is to use the gravity model that includes traditional gravity variables, such as distance. Because a considerable portion of the data were constructed using gravity estimations, we refrained from using it in our analysis to avoid statistical problems. However, the observations constructed by using gravity estimations were easily removed from the data, and the remaining observations then yielded additional information. We used this method to add missing values to our dataset. However, the number of missing or zero observations in our data was still very high, which affected the statistical significance of our results.

[8] See https://ec.europa.eu/eurostat/statistics-explained/index.php/International_trade_in_services#General_overview

As explained in Chapter 4.2, we used an index that takes values between 0 and 1 as proxies for trade agreements in our data. The index is higher in “deeper” agreements (i.e., agreements that cover many provisions, such as services liberalisation or competition policy). We derived the index by using the World Bank’s Horizontal Depth database (Hofman, Osnago and Ruta 2017). This database contains information on 52 policy areas and their legal enforceability in 279 trade agreements among 189 countries from 1958–2015 (Hofman, Osnago and Ruta 2017). We selected 18 areas that we found were the most important and then generated our index by dividing the number of provisions included in each agreement by this total number. For the years after 2015, the index used the same values as in 2015, except when there were known changes, which we input manually.

The horizontal depth database contains only trade agreements that were still ongoing in 2015. However, many agreements were dissolved before this year, such as in the case of some East European countries that first had bilateral trade agreements with EU and then later joined the union. In this case, the EU membership replaced the previous trade agreements. To include these former trade agreements, we used the Trade Agreement Heterogeneity database (Kohl, Brakman and Garretsen, 2017). This database contains data on different trade agreements and their policy areas from 1948–2011. It also includes agreements that are no longer in force. Because the included provisions are similar to those in the horizontal depth database, we used it to construct indices on former trade agreements, and we combined these with our main data. Finally, our index covered all international trade agreements from 1988–2017.[9]

In estimating the average effect of the EU FTAs for the EU, we constructed an EU FTA agreement index between 0 and 1 to describe the depth of the agreements. If the EU had a trade agreement currently in force with the country, the index is positive, and zero otherwise. We also constructed separate FTA dummy variables for exports and imports to distinguish the effects according to the direction of trade flow. We included an EU dummy for all EU countries to control for the effects of EU intra-trade on the new EU countries. The EU dummy captured only EU accessions that occurred after 1988; that is it equalled 1 for a country when it joined the EU and afterward. In addition, we controlled for the effects of all the other trade agreements in the world by including a dummy variable for them. All our dummy variables included only the agreements that had entered into force after the beginning of our observation period to find the effects of their enforcement.

Most current FTA agreements of the EU were entered into force after 1988, except those with the EFTA countries. The EFTA countries already had bilateral trade

[9] To be specific, the data include agreements of which the WTO has been notified, such as the Horizontal Depth database notes.

agreements with the European Economic Community (EEC) since the 1970s. Finland, Austria and Sweden were still EFTA countries in 1988, the first year of our data period, but they joined the EU in 1995.[10] The EU membership implied that these three countries switched from being EU FTA partner countries to EU countries that enforced existing FTAs of the EU.

In this study, we focused on the effects of EU FTAs on Finland. Therefore, we needed to consider that first, Finland was an EU FTA partner as an EFTA country until 1994 and a member of the EU thereafter. In our econometric specifications, we chose to exclude the impact of Finland, Austria and Sweden as EU FTA partners and to control the effects of their EFTA membership from 1988– 994 as a part of the RTA dummy variable that captured all the other regional trade agreements.

For the three remaining EFTA countries, Norway, Iceland and Liechtenstein, the EFTA was replaced by the current EEA agreement in 1994. Switzerland chose not to join the EEA and replaced its previous bilateral agreement with the EU by a deeper agreement in 2002. We included the EEA agreement starting in 1994 in our EU FTA dummy variable and the prior agreements in the general RTA dummy variable for all trade agreements. We also included Switzerland's prior agreements with the EU in the RTA dummy variable, and the current agreement were captured by the EU FTA dummy variable.

The EU's new trade agreements have wide coverage; that is, all the agreements in this study include all 18 provisions included in our RTA index, as discussed in Chapter 4. Therefore, in imposing these agreements in our study, we used the maximum value 1 for the index. For Japan, Singapore and Vietnam, we changed the index from 0 to 1. Because Mexico already had a trade agreement that covered many of the provisions in our index, the index was changed slightly from 0.83 to 1. Consequently, we did not expect Mexico's updated agreement to have as large an impact on trade flows as completely new agreements did.

In the next subsection, we present the results of our estimations.

5.3 Results

In this section, we describe our estimation of the average effect of FTAs with EU countries from 1988–2017. Moreover, because trade agreements may have

[10] Denmark, the United Kingdom and Portugal had already left the EFTA and joined the EU before 1988.

heterogeneous effects on different parties (Baier et al., 2019), it was also important to distinguish the effects on Finland from the average effects on the EU. Thus, we conducted an individual analysis of Finland. We also estimated the effects on Sweden and Germany, which are Finland's most important trading partners within the EU. Therefore, they were chosen as reference countries for comparison.

5.3.1 The ex-post effects of EU FTAs on EU countries

Table 5.3.1 shows the estimated coefficients. Columns (1–3) show the estimations of the total trade effects of the EU's trade agreements, while columns (4-6) separate the effects of imports and exports. We first included only the EU FTA variables and then variables controlling for EU enlargements after 1988 (*EU*) and all other trade agreements (*other RTAs*). As the table shows, the coefficients of the EU's FTAs were positive and statistically significant for both total trade and separate exports and imports. Because the effects were divided differently between imports and exports, we focused on studying them separately, as described in the following paragraph.

When the trade effects were separated into imports and exports, the coefficient for the effects of trade agreement effects with the EU as the exporter was positive and statistically significant at the one per cent level. This result implies that a trade agreement with the maximum level of coverage (i.e., the value equalled one; i.e. all provisions were in the agreement) has increased EU's exports to the partner countries by approximately 34 per cent. For imports, the estimated coefficient was not as statistically significant, but it was still significant at the 10 per cent level if EU accessions and all other trade agreements were controlled. The coefficient translates into a growth of approximately 14 percent in imports from FTA partner countries to the EU.

The EU variable of the effects of EU enlargements was statistically significant, which implied large positive impacts of the trade between new and the old EU members. The estimated coefficient translates into a growth in trade of approximately 57 per cent in trade (i.e., not separated into exports and imports). This is lower than the estimates of National Bord of Trade Sweden (2019) for the EU enlargements since 2004. They find that trade between the EU and the new EU members increased by 78 to 119 per cent. One plausible reason why we find smaller effects is that we control for the effect of the overall globalisation, which some cases could lead to overly low estimates of the EU effects. The EU variable is important in our estimations, as the countries that joined the EU after 1988 entered the union and started enforcing their FTAs at the same time. As already noted, the EU variable affects the significance of the coefficient of EU imports from FTA partners.

The coefficient estimated for all other trade agreements was not statistically significant, and it did not greatly impact our results. This effect could explained by the large number of different trade agreements around the world because there are wide variations in their separate impacts.

Table 5.3.1. The effects of EU FTAs on EU exports and imports

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)
EU FTA - EU total	0.172***	0.207***	0.213***			
	(0.0539)	(0.0548)	(0.0559)			
EU FTA - EU as importer				0.0941	0.127*	0.133*
				(0.0730)	(0.0740)	(0.0748)
EU FTA - EU as exporter				0.251***	0.288***	0.293***
				(0.0706)	(0.0717)	(0.0727)
EU		0.436***	0.452***		0.436***	0.452***
		(0.0573)	(0.0630)		(0.0572)	(0.0629)
Other RTAs			0.0393			0.0387
			(0.0576)			(0.0575)
Observations	211,374	211,374	211,374	211,374	211,374	211,374
R-squared	1.000	1.000	1.000	1.000	1.000	1.000

Robust standard errors, clustered by country pair, are in parentheses. All specifications include importer-time, exporter-time and pair fixed effects, and in addition dummies that control for globalisation. The fixed effects and globalisation dummies are not reported for brevity. *** p<0.01, ** p<0.05, * p<0.1

In addition to their immediate effects, trade agreements have been found to have effects that last 10–15 years, and the adjustment of trade flows can also be slow (Bergtrand et al., 2015). There can also be anticipation effects of the agreements when they are negotiated and signed but not yet in force. To determine whether these effects were important for the EU FTAs in our study, we added lags of +5, +10, and +15 years and a lead of -5 years to our model. Table 5.3.2. presents these results. As the table shows, the immediate impact was the largest on exports, but there was a statistically significant lagged effect five years after the enforcement of the FTAs. The estimated coefficient of this lag translated into an increase of approximately 10 per cent. In addition, the lead variable was positive for EU's exports, which indicated some effects of anticipation. Regarding imports, the table shows that the effects were mainly present but with some lags. Only the 5 and 15-year lags were significant for imports. Because many of the EU's FTA partners were a part of the GSP programme

before entering FTAs, their EU import duties were already low. Hence, The FTA did not show an immediate effect of lowering tariffs. Instead, the implementation of other parts of the agreements and the increased cooperation between the new FTA partners were likely contributors to the lagged effect.

Table 5.3.2. The effects of EU FTAs on EU exports and imports with dynamic effects

VARIABLES	(1)	(2)	(3)
EU FTA - EU as importer	-0.0393	-0.0214	-0.0166
	(0.0483)	(0.0488)	(0.0494)
EU FTA - EU as importer LEAD 5	0.0717	0.0928	0.0958
	(0.0583)	(0.0585)	(0.0587)
EU FTA - EU as importer LAG 5	0.0937	0.0990*	0.100*
	(0.0575)	(0.0578)	(0.0578)
EU FTA - EU as importer LAG 10	0.143	0.145	0.148
	(0.114)	(0.114)	(0.114)
EU FTA - EU as importer LAG 15	0.178**	0.180**	0.181**
	(0.0807)	(0.0811)	(0.0812)
EU FTA - EU as exporter	0.128***	0.147***	0.151***
	(0.0335)	(0.0339)	(0.0343)
EU FTA - EU as exporter LEAD 5	0.0915**	0.111**	0.114**
	(0.0464)	(0.0469)	(0.0470)
EU FTA - EU as exporter LAG 5	0.0779*	0.0904**	0.0918**
	(0.0424)	(0.0424)	(0.0426)
EU FTA - EU as exporter LAG 10	0.0681	0.0699	0.0702
	(0.159)	(0.159)	(0.158)
EU FTA - EU as exporter LAG 15	-0.0579	-0.0584	-0.0578
	(0.0854)	(0.0858)	(0.0857)
EU		0.441***	0.461***
		(0.0573)	(0.0633)
Other RTAs			0.0467
			(0.0579)
Observations	211,374	211,374	211,374
R-squared	1.000	1.000	1.000

Robust standard errors, clustered by country pair, are in parentheses. All specifications include importer-time, exporter-time and pair fixed effects, and in addition dummies that control for globalisation. The fixed effects and globalisation dummies are not reported for brevity. *** p<0.01, ** p<0.05, * p<0.1

5.3.2 The ex-post effects of EU FTAs on Finland, Sweden and Germany

5.3.2.1 Finland

Next, we estimated the effects of the EU's trade agreements on Finland compared with the rest of the EU. We used data from 1995–2017 because Finland and Sweden joined the EU in 1995. Before 1995, both countries were EU partner countries with an FTA agreement (EFTA). The FTA dummy variables thus captured only the effects of FTA agreements that came to force after 1995. The effects of the EU's existing FTAs on Finland and Sweden were included in the overall effect of joining the EU; therefore, they could not be identified. We estimated the effects of EU FTAs that came into force from 1996 onwards on Finland and the reference countries.

Table 5.3.3 shows the results for Finland. In the table, the effects on imports and exports are presented separately. To compare the results in the same time period, we included the same general EU-level dummies shown in column 4 in Table 5.3.1 in column 4 of Table 5.3.3. The estimated coefficients were similar in both periods, so the chosen period did not greatly affect our results. However, it should be noted that the estimated coefficient for EU imports from FTA partner countries was not statistically significant. We will elaborate this result later in this report.

The results differed from the results for the aggregate EU level of imports and exports, especially when Finland was the importing country. On one hand, the estimated coefficient for Finland as an importer in an EU FTA implied that the FTAs had decreased trade flows from partner countries by approximately 23 per cent. On the other hand, the estimated coefficients of exports were positive at about 5 per cent, but the estimate was not precise. The coefficients did not change much by adding the EU and other RTA control variables, as shown in columns 2 and 3. Because the inclusion of the lag and lead variables did not show statistically significant effects, they are not presented here.

It should be noted that we controlled for the effect of overall globalisation in our estimations, which implies that the general effect of growing international trade relative to intra-country trade was excluded from the FTA effects. In some cases, this could lead to overly low estimates of FTA effects. The reason is that some developing countries were rapidly opened for foreign trade in the 1990s, which increased the average effect of globalisation. Nevertheless, controlling for globalisation is the recommended practice because it has been an important factor in international trade in recent decades.

The negative effect of EU FTAs on imports to Finland and the statistically insignificant positive effect on exports were unexpected results. At the EU level, the import and export effects were positive, but it should be noted that the EU-level estimates included the effects of the EEA agreement, which that came into effect in 1994, and the agreements with Baltic states, which came into effect in 1995. In using the same observation period for the EU, the effect of the EU FTA was no longer statistically significant for aggregate EU imports, as previously noted. This result supports the hypothesis that the EEA agreement has had an important positive impact on the EU's imports.

Regarding Finland, the effects of these agreements were not included because this country was a member of the EFTA before joining the EU in 1995, and we included agreements only from 1996 onwards in this analysis. The EU agreements with Baltic countries may have had some effects on Finland, but trade had already increased significantly in 1992 when Finland signed bilateral free trade agreements with these countries.[11] Moreover, we were not able to distinguish the significance of the EEA agreement for Finland because until 1994, the EEA countries Iceland, Liechtenstein and Norway were EFTA members in addition to Finland, Sweden and Austria. In particular, Norway is an important trading partner of Finland, but trade between the countries has been facilitated by long-standing integration within the EFTA before the enforcement of the EEA agreement.

One plausible explanation for the negative or insignificant effects of EU FTAs on Finland is the enlargement of the EU. There is some evidence of the limited trade diversion of EU imports due to EU enlargements (see e.g., Wilhelmsson 2006). The enlargement of the EU by ten Central and Eastern European countries (CEECs) in 2004 and 2007 may have diverted trade from the EU FTA partners to the new EU member countries. In all our estimations, the coefficient of the EU dummy was positive and significant, which suggests that the enlargements of the EU stimulated trade between old and new EU countries.

The result that EU's FTA agreements did not have a statistically significant positive effects on Finnish exports could also be explained by that the fact that many partner countries that signed FTAs with the EU are not important Finnish export destinations. In chapter 4, Table 4.3.1 shows that of the EU's FTA partner countries that signed an agreement after 1995, only Turkey, Mexico, South Korea and Canada were relatively important Finnish export destinations in 2016. Furthermore, the FTA with Canada

[11]The volume of trade under these agreements, especially with Estonia, increased vigorously. In 1991, Finland's market shares were still 2.3% of Estonia's exports and 2.0% of its imports, whereas one year later, they had increased to 21.2% and 22.6%, respectively.

came into force only in 2017, and its effects therefore did not materialise in the ex-post estimations of the effects.

In chapter 4, however, Figure 4.3.1 shows that the long-term trend in Finnish exports to Turkey, Mexico and South Korea were positive and, at least for Turkey and South Korea, we observed a visible increase in exports during the initial years when EU FTAs came into force. Other factors could have determined the overall positive trend in Finnish exports to these countries as well as to other countries that did not sign agreements during the period. This explanation is supported by our uncontrolled estimations of the effects of overall globalisation (see Appendix A3). In these estimations, the effects of EU FTAs on exports were positive and statistically significant. These results suggest that when we did not control for the overall globalisation effect, the EU FTAs increased Finnish exports by about 25 per cent. Furthermore, while the EU FTAs still had a negative effect on imports to Finland, the effect was no longer statistically significant. We may thus conclude that although Finnish exports to the EU's FTA partner countries increased, it could be explained by the overall increase in trade due to globalisation rather than by the EU FTAs.

Table 5.3.3 The effects of EU FTAs on Finnish exports and imports 1995-2017

VARIABLES	(1)	(2)	(3)	(4)
EU FTA - Finland as importer	-0.274**	-0.264**	-0.264**	
	(0.117)	(0.117)	(0.117)	
EU FTA - Finland as exporter	0.0300	0.0485	0.0487	
	(0.0860)	(0.0852)	(0.0857)	
EU FTA - Rest of EU as importer	0.0691	0.101	0.102	
	(0.0674)	(0.0682)	(0.0687)	
EU FTA - Rest of EU as exporter	0.242***	0.280***	0.281***	
	(0.0642)	(0.0645)	(0.0653)	
EU		0.584***	0.584***	0.584***
		(0.0454)	(0.0457)	(0.0457)
Other RTAs			0.00197	-0.000467
			(0.0585)	(0.0511)
EU FTA - EU as importer				0.0978
				(0.0746)
EU FTA - EU as exporter				0.277***
				(0.0721)
Observations	177,220	177,220	177,220	177,220
R-squared	1.000	1.000	1.000	1.000

Robust standard errors, clustered by country pair, are in parentheses. All specifications include importer-time, exporter-time and pair fixed effects, and in addition dummies that control for globalisation. The fixed effects and globalisation dummies are not reported for brevity. *** p<0.01, ** p<0.05, * p<0.1

5.3.2.2 Sweden and Germany

Next, we studied the effects of EU FTAs on the two reference countries. Sweden and Germany are Finland's most important trading partners in the EU. Sweden and Finland also share many economic similarities: both countries joined the EU 1995 and previously both were members of the EFTA. Hence, we expected that the effects of the EU's trade agreements to be similar on both countries. The other reference country, Germany, is the largest economy in the EU. Therefore, we expected that the effects of the EU's FTAs on Germany would reflect the EU average.

Table 5.3.4 shows the results for Sweden. As expected, the results were similar to those for Finland. The estimated coefficients of the EU's FTAs with Sweden and Finland as importers were negative, but the effect was greater on Finland. In addition, as in case of Finland, the coefficient of EU FTAs for Sweden's exports was not statistically significant. These results implied that the EU's trade agreements decreased imports from Sweden to partner countries by approximately 32 per cent. As

we already noted regarding Finland, the negative results may seem unexpected, but they could be explained by country-specific factors. For example, the effects of globalisation on Finland and Sweden may have differed from the world average.

Regarding Germany, as expected, the results shown in Table 5.3.5 were similar to the EU average. This result confirmed that Germany had a large weight in our general EU-level results. The statistical significance was again lower than in the aggregated EU level because of the shorter period, the smaller number of FTAs, and the smaller number of observations.

Table 5.3.4 The effects of EU FTAs on Swedish exports and imports 1995-2017.

VARIABLES	(1)	(2)	(3)
EU FTA - Sweden as importer	-0.394***	-0.382***	-0.382***
	(0.139)	(0.137)	(0.137)
EU-FTA - Sweden as exporter	0.0710	0.0885	0.0887
	(0.0914)	(0.0902)	(0.0906)
EU FTA - EU as importer	0.0721	0.104	0.105
	(0.0674)	(0.0682)	(0.0688)
EU FTA - EU as exporter	0.244***	0.282***	0.282***
	(0.0645)	(0.0648)	(0.0656)
EU		0.584***	0.584***
		(0.0454)	(0.0457)
Other RTAs			0.00197
			(0.0585)
Observations	177,220	177,220	177,220
R-squared	1.000	1.000	1.000

Robust standard errors, clustered by country pair, are in parentheses. All specifications include importer-time, exporter-time and pair fixed effects, and in addition dummies that control for globalisation. The fixed effects and globalisation dummies are not reported for brevity. *** p<0.01, ** p<0.05, * p<0.1

Overall, our results indicate that EU FTAs have had a positive effect on the exports from EU countries, including Germany, to their partner countries. In addition, the effect on imports from partner countries was positive at the EU level. In contrast, regarding Finland and Sweden, the estimated effects on exports were positive but not statistically significant, and the effects on imports were negative. These results suggest that Finland has not benefitted from EU FTAs in terms of increasing exports and import opportunities. However, Finnish exports to EU FTA partner countries have increased, which could be explained by globalisation rather than by EU FTAs. In

addition, the total effects likely included sectoral variations. In section 5.3.4. we further explore the effects by industry on the EU in general and on Finland in particular.

Table 5.3.5 The effects of EU FTAs on German exports and imports 1995-2017.

VARIABLES	(1)	(2)	(3)
EU FTA - Germany as importer	0.137	0.154	0.154
	(0.133)	(0.135)	(0.135)
EU-FTA - Germany as exporter	0.199**	0.223***	0.223***
	(0.0787)	(0.0789)	(0.0795)
EU FTA - EU as importer	0.0443	0.0811	0.0814
	(0.0640)	(0.0649)	(0.0657)
EU FTA - EU as exporter	0.254***	0.297***	0.298***
	(0.0686)	(0.0683)	(0.0691)
EU		0.584***	0.584***
		(0.0454)	(0.0457)
Other RTAs			0.00210
			(0.0585)
Observations	177,220	177,220	177,220
R-squared	1.000	1.000	1.000

Robust standard errors, clustered by country pair, are in parentheses. All specifications include importer-time, exporter-time and pair fixed effects, and in addition dummies that control for globalisation. The fixed effects and globalisation dummies are not reported for brevity. *** p<0.01, ** p<0.05, * p<0.1

5.3.3 The effects of the EU's new trade agreements

The previous analysis was conducted to estimate the ex-post effects of existing trade agreements. We next aimed to predict the effects of EU's new trade agreements with Japan, Singapore and Vietnam as well as the updated agreement with Mexico. For this purpose, we used a general equilibrium gravity model that allowed for counterfactual scenarios of different hypothetical trade agreements. The general equilibrium framework is presented in detail in the Appendix.

In the general equilibrium analysis, we first estimated the overall average partial effect of EU's trade agreements. That is, we did not separate the coefficients of the importer and exporter to simplify the computation. The estimated coefficient of the average trade agreement effect was 0.21, which translates to approximately a 23-per cent growth in trade flows due to the agreements. This value was used later when we

computed the changing trade costs for each new trade agreement partner. We conducted separate analyses for each new trade agreement.

Table 5.3.6. shows the predicted effects on trade flows in percentages for each country. These effects are separated for imports and exports, and they equal the changes in total trade with all partners. In the table, each new agreement is listed separately. The table shows Finland, Sweden and Germany as well as the EU average, the new trade agreement partners, and some large countries. As the table shows, Japan, Singapore, Vietnam and Mexico will enjoy the greatest effects of their respective EU FTA agreements. The EU–Japan agreement is expected to have the largest impact on the EU's imports and exports. This result was expected because Japan has the largest trade volume with the EU among the new trade agreement partners. In contrast, the expected effects on Japanese exports and imports are close to those on Vietnam. This result is likely because the EU is an important trading partner of both countries. However, Vietnam is the EU's 16th largest trading partner in goods; consequently, the effects of the EU–Vietnam agreement are not as large on the EU side. Singapore is in the middle range of the effects of trade. As expected, the updated EU–Mexico agreement is not expected to have large trade effects, because the change from the previous agreement is not significant in our trade agreement index.

Table 5.3.6. The effects of EU FTA agreements with Japan, Singapore, Vietnam and Mexico

Country	EU-Japan		EU-Singapore		EU-Vietnam		EU-Mexico (update)	
	Δ% Exports	Δ% Imports	Δ% Exports	Δ% Imports	Δ% Exports	Δ% Imports	Δ% Exports	Δ% Imports
Japan	2.03	2.29	-0.02	-0.03	-0.02	-0.02	0	0
Mexico	-0.01	-0.01	0	0	0	0	0.09	0.09
Singapore	-0.02	-0.02	1.49	1.29	-0.02	-0.01	0	0
Vietnam	-0.03	-0.04	-0.03	-0.04	1.56	2.14	0	0
Finland	0.32	0.34	0.07	0.08	0.03	0.03	0.01	0.01
Sweden	0.21	0.22	0.07	0.08	0.04	0.04	0.01	0.01
Germany	0.32	0.41	0.11	0.14	0.06	0.07	0.02	0.02
EU average	0.20	0.19	0.08	0.08	0.04	0.03	0.01	0.01
China	-0.04	-0.09	-0.02	-0.04	-0.02	-0.03	0	-0.01
Russia	-0.05	-0.08	-0.01	-0.02	-0.02	-0.03	0	0
South Korea	-0.03	-0.05	-0.02	-0.03	-0.02	-0.03	0	0
USA	-0.05	-0.04	-0.03	-0.02	-0.02	-0.01	-0.03	-0.02

Note: In this analysis, we have not estimated a separate coefficient for trade agreement impacts depending on the direction of trade. Rather, we use the same coefficient for total trade impacts in calculating how potential trade effects would be. The impacts are later separated into imports and exports as shown in this table.

Regarding the effects on Finland, the results indicated that all four new trade agreements considered are expected to increase Finnish exports and imports. This result contrasts the estimated ex-post effects reported in section 5.3.2. The reason is that we used the EU level coefficient of total trade impacts to estimate the initial impact of the EU's trade agreements.[12] We then used this coefficient in later stages of the analysis. The effects of the FTA agreement with Japan will be the largest on Finland as for the EU in total: a 0.32% increase in exports and a 0.34% increase in imports. The EU FTA with Singapore is expected to generate positive effects on Finnish exports and imports, while the trade agreements with Vietnam and Mexico have small expected effects.

5.3.4 Sector-specific estimations

In this subsection, we report the results of estimating the effects of EU FTAs at the sector level. Because the aggregate results were likely subsume sectoral variations, the industry-level estimations helped us better understand the results presented in section 5.3.2.

We began by aggregating the HS6 product level data in 23 sectors according to the International Standard Industrial Classification, Revision 4 (ISIC Rev. 4). Our classification of industries followed the World Input–Output Database (WIOD). We applied this classification because we subsequently used the sector-level estimates obtained from the gravity analysis reported in this section to analyse the effects of EU FTAs on global value chains using the WIOD database.

Service sectors were not included in the sectoral estimates because the trade data used in the gravity estimations consisted only of physical goods. Consequently, the products were identified as being in either primary or secondary sectors. However, if we were able to include trade in service products, we would find that much of that trade was by manufacturing firms and not service sector firms.

The sector-specific effects were estimated using the same estimation model as described in section 5.3.1 except the following: the origin-time fixed effects became origin-industry time effects; the destination-time fixed effects become destination-industry time effects; and pair-specific terms become origin-destination, industry-specific terms. (See Larch, Wanner, Yotov, and Zylkin, 2017; and Zylkin's on-line memorandum 'Help file for ppml_panel_sg'). We used the PPML estimation method

[12] For computational reasons, it was not feasible to construct the FTA effects on each country or the direction of trade in the general equilibrium analysis.

and clustered standard errors.[13] This analysis differed from the previous analysis because the study period was shorter (i.e., every third year between 2004 and 2016).

5.3.4.1 Impact on total trade by sectors

We began by estimating the effects of EU FTAs on total trade flows in the 23 sectors. In Table 5.3.7, the results shown in column (1) are the average percentage changes in goods trade between the EU countries and their FTA partners by sector following the signing of FTA between them. The results in column (2) show the percentage change in the trade between Finland and the partner countries in controlling for the aggregate effect on the EU (excluding Finland). The statistical significance of the estimates are indicated by stars, but the standard errors are not included in the table.

FTAs have the largest positive and statistically significant effects on the EU trade of coke and refined petroleum products (+48%), textiles, wearing apparel, leather etc. (+23%), basic pharmaceutical products and preparations (+22%), chemicals and chemical products (+19%), and fabricated metal products (+16%). In contrast, the results show a statistically significant negative effect on the trade of computers, electronic and optical products (–32%).

The results for Finland when we controlled for the total effect on the rest of the EU show positive and statistically significant impacts on the Finnish trade in forestry and logging (+954%), chemicals and chemical products (+53%), wood and wood and cork products (+36%), paper and paper products (+35%), electrical equipment (+34%), and textiles, wearing apparel, leather etc. (+25%). It should be noted that the effect on the rest of the EU is negative but not statistically significant.

[13] The level of tolerance indicated the level of changes in the likelihood function at which the algorithm concludes that a (local) maximum is found. While the level was (1e-12) by default, it was decreased to (1e-10) in the estimations for the EU shown in Table 5.3.7 because the model did not converge with the default option. For Finland, it was decreased to (1e-9) in Table 5.3.7 and to (1e-10) in Tables 5.3.8 and 5.3.9 for the same reason. It is likely that the estimation did not converge because there were too few data points. We regarded (1e-9) as a sufficient level of tolerance in the estimations.

Table 5.3.7 The effects of EU FTAs on total trade by production sectors on average in the aggregate EU and Finland, %

	EU (1)		Finland (2)	
The rest of the EU (excl Finland)	..		-1.587	
A 01 Crop and animal production, hunting and related service activities	0.7		20.3	
A 02 Forestry and logging	-33.3		953.8	**
A 03 Fishing and aquaculture	-9.2		50.4	
B Mining and quarrying	23.1		2.8	
C 10-12 Manufacture of food products, beverages, and tobacco products	4.5		-9.9	
C 13-15 Manufacture of textiles, wearing apparel, leather etc.	22.5	**	24.9	*
C 16 Manufacture of wood and of products of wood and cork	11.9		35.8	*
C 17 Manufacture of paper and paper products	11.5	*	35.3	**
C 18 Printing and reproduction of recorded media	-28.7		..	
C 19 Manufacture of coke and refined petroleum products	47.7	**	-21.6	
C 20 Manufacture of chemicals and chemical products	18.8	***	52.8	***
C 21 Manufacture of basic pharmaceutical products and preparations	22.4	**	80.4	
C 22 Manufacture of rubber and plastic products	3.8		-20.1	
C 23 Manufacture of other non-metallic mineral products	-9.7		-5.5	
C 24 Manufacture of basic metals	-16.3		-30.0	
C 25 Manufacture of fabricated metal products	16.1	***	3.9	
C 26 Manufacture of computer, electronic and optical products	-31.8	***	-7.6	
C 27 Manufacture of electrical equipment	6.9		34.4	*
C 28 Manufacture of machinery and equipment n.e.c.	-8.7	*	-15.1	
C 29 Manufacture of motor vehicles, trailers and semi-trailers	11.3		-6.6	
C 30 Manufacture of other transport equipment	17.0		93.3	
C 31 Manufacture of furniture	2.3		-8.1	
D 35 Electricity, gas, steam and air conditioning supply	-54.1	*	..	
Observations	872,334		872,334	
R-squared	0.990		0.990	

Note: Clustered standard errors. For reasons of multicollinearity, the estimates for Finland in two sectors (C 18 Printing and reproduction of recorded media, and D 35 Electricity, gas, steam and air conditioning supply) we not computed by Stata. *** p < 0.01, ** p < 0.05, * p < 0.1.

5.3.4.2 Impact on imports and exports

The aggregation of imports and exports could have masked important differences between the two. From a theoretical point of view, we expect that differences in comparative advantage would cause varying sectoral effects on imports and exports in different countries.

Consequently, we conducted separate estimates of the effects of the EU FTAs on imports and exports in the 23 sectors. Tables 5.3.8 and 5.3.9 show the results for imports and exports, respectively, in the EU and Finland. In Table 5.3.8, columns 1 and 2 show the sectoral results in per cent changes in imports for the EU and Finland, respectively. Columns 3 and 4 show the share of each sector in the total value of Finnish goods imports in 2004 and 2016, respectively.[14] The results show the average percentage change in trade by sectors between the EU countries and their FTA partners followed the signing of an FTA between them. We report the statistical significance of the estimates but not the standard errors.

In Table 5.3.8, the results for the EU in total (column 1) show that the effects of the FTAs varied significantly from sector to sector. The average sectoral effects on EU imports are predominantly negative. This result is consistent with the negative result for aggregate imports reported in section 5.3.2. The largest and most statistically significant negative effects in EU imports were in high-tech metal industries, such as computer, electronic and optical products (-42%), as well as other machinery and equipment (–31%), but also in basic metals (-32%). In contrast, the results show a positive effect on the imports of chemicals and chemical products (+53%) as well as on textiles, wearing apparel and leather products (+19%). Regarding Finland (column 2), the results show an overall resemblance to the average EU results but some differences between the sectors. Compared with the EU results, it is not surprising to find different results at the level of sectors because Finland is a small country with a production and export market structure that differs from the EU average.

The results show that the EU's FTAs have had a statistically significant negative impact on Finnish imports from FTA partner countries in goods produced in the following sectors: the manufacturing of other machinery and equipment n.e.c. (–80%), rubber and plastic products (-38%), other non-metallic mineral products (-34%), and fabricated metal products (-21%), as shown in column 2 in Table 5.3.8. A statistically less significant negative impact was also found on the imports of goods produced by manufacture of computers, electronic and optical products (-22%). Of these industries, the manufacture of other machinery and equipment accounted for an important share of the total imports (9.7% in 2016), whereas the other industries were less important in the total imports to Finland (column 4 in Table 5.3.8).

[14] Import and export shares were computed in the section. The data are those used in the estimations.

Table 5.3.8 The effects of EU FTAs on goods imports by production sectors on average in the aggregate EU and Finland, %

	EU		Finland		Share in total Finnish imports	
	(1)		(2)		(3)	(4)
					2004	2016
The rest of the EU (excl Finland)	..		-15.0	***		
A 01 Crop and animal production, hunting and related service activities	-0.1		2.4		1.9	2.5
A 02 Forestry and logging	-45.7		..		1.3	0.4
A 03 Fishing and aquaculture	-7.7		19.1		11.0	9.4
B Mining and quarrying	-9.2		-0.6		11.0	9.4
C 10-12 Manufacture of food products, beverages, and tobacco products	11.9		-21.0		4.4	6.4
C 13-15 Manufacture of textiles, wearing apparel, leather etc.	19.4	*	19.8		4.2	4.3
C 16 Manufacture of wood and of products of wood and cork	11.2		75.4		0.9	0.8
C 17 Manufacture of paper and paper products	20.6		36.6		1.5	1.5
C 18 Printing and reproduction of recorded media	-17.9		..		0.0	0.0
C 19 Manufacture of coke and refined petroleum products	10.0		-1.2		2.4	3.8
C 20 Manufacture of chemicals and chemical products	53.4	***	29.3	***	7.5	7.2
C 21 Manufacture of basic pharmaceutical products and preparations	16.5		1291.5	***	3.1	3.7
C 22 Manufacture of rubber and plastic products	-3.3		-38.3	***	2.3	2.8
C 23 Manufacture of other non-metallic mineral products	-17.3		-34.2	***	1.0	1.1
C 24 Manufacture of basic metals	-32.1	**	-76.5		5.7	4.1
C 25 Manufacture of fabricated metal products	15.1		-20.6	**	2.2	3.5
C 26 Manufacture of computer, electronic and optical products	-41.6	***	-22.4	*	12.6	8.8
C 27 Manufacture of electrical equipment	-13.2		30.5	**	5.6	5.3
C 28 Manufacture of machinery and equipment n.e.c.	-30.5	***	-80.1	***	8.6	9.7
C 29 Manufacture of motor vehicles, trailers and semi-trailers	-6.5		-4.1		8.6	8.6
C 30 Manufacture of other transport equipment	-14.2		1336.8	***	1.3	2.2
C 31 Manufacture of furniture	27.4		38.3		2.4	3.2
D 35 Electricity, gas, steam and air conditioning supply	-22.7		..		0.6	1.3
Observations	872,334		872,334			
R-squared	0.990		0.990			

Note: Clustered standard errors. For reasons of multicollinearity, the estimates for Finland in three sectors (A 02 Forestry and logging, C 18 Printing and reproduction of recorded media, and D 35 Electricity, gas, steam and air conditioning supply) we not computed by Stata. *** p < 0.01, ** p < 0.05, * p < 0.1.

Although the impact on imports was negative in many industries, the results show that the EU FTA increased Finnish imports from FTA partner countries in goods produced by the manufacture of other transport equipment (+1,300%), basic pharmaceutical products and preparations (almost +1,300%), electrical equipment (+31%), and

chemicals and chemical products (+29%). Of these industries, chemical products (7.2% in 2016) and electrical equipment (5.3%) accounted for the most important shares in the total imports to Finland. Although some estimated changes were very large, the initial value of imports from the EU FTA countries in these industries was small, as shown in column 3 in Table 5.3.8..

Table 5.3.9. shows the results for exports. The average effect on EU exports was positive in most sectors, as shown in column 1. All metal industry sectors benefitted from the FTAs, especially transport equipment and electrical equipment. The increase was over 50 per cent in motor vehicles, almost 90 per cent in other transport equipment, and 30 per cent in electrical equipment. There was a 16 per cent increase in the exports of fabricated metal products. Other sectors that showed a positive impact were in the chemical industry: coke and refined petroleum products (+113%); pharmaceutical products (+24%); and rubber and plastic products (+14%). In addition, mining and quarrying showed a very large positive effect (over +600%), which was larger than any other industry showed. These results indicate that FTAs have benefitted Europe's strong metal and chemical industries. In these knowledge-intensive sectors, the EU has a comparative advantage. Lower trade costs can generally be expected to benefit countries' industries with a comparative advantage. These results are in line with the theory of international trade.

In Finland, the effect of EU FTAs on exports was positive for goods produced by the manufacture of chemicals and chemical products (+60%), wood and of wood and cork products (+42%), paper and paper products (+39%), basic pharmaceutical products and preparations (+32%), the produce of crop and animal production (+268%), and forestry and logging (over +1,100%), which are shown as seen in column 2 in Table 5.3.9. Of these industries, the manufacture of chemicals and chemical products (7.9% in 2016), wood and wood and cork products (4.7%), paper and paper products (18.7%), and basic pharmaceutical products and preparations (3.3%) accounted for a relatively important share of total Finnish exports, as shown in columns 3 and 4 in Table 5.3.9.

The effect on exports was statistically weak but positive in goods produced by many metal industries, including the manufacture of other machinery and equipment (+38%), electrical equipment (+36%), basic metals (+36%), and rubber and plastic products (+50%). The first three of these industries accounted for important shares of total Finnish exports. The results showed that the EU FTAs had a statistically significant negative effect on exports of goods produced by the manufacture of motor vehicles, trailers and semi-trailers (-73%), and furniture (-40%). A statistically less significant effect was found in the manufacturing of coke and refined petroleum products (-58%) as well as mining and quarrying (-96%).

Table 5.3.9 The effects of EU FTAs on goods exports by production sectors on average in the aggregate EU and Finland, % (continued from previous table)

	EU		Finland		Share in total Finnish exports	
	(1)		(2)		(3)	(4)
					2004	2016
The rest of the EU (excl Finland)	..		17.4	***		
A 01 Crop and animal production, hunting and related service activities	6.8		268.4	***	0.8	0.9
A 02 Forestry and logging	-20.6		1118.2	**	0.2	0.2
A 03 Fishing and aquaculture	-17.0		..		0.3	0.6
B Mining and quarrying	643.4	**	-96.3	*	0.3	0.6
C 10-12 Manufacture of food products, beverages, and tobacco products	-3.0		1.0		2.0	2.3
C 13-15 Manufacture of textiles, wearing apparel, leather etc.	25.0	*	22.1		1.2	0.9
C 16 Manufacture of wood and of products of wood and cork	12.4		41.6	**	5.4	4.7
C 17 Manufacture of paper and paper products	7.4		39.1	**	21.7	18.7
C 18 Printing and reproduction of recorded media	-31.1		..		0.0	0.0
C 19 Manufacture of coke and refined petroleum products	113.0	***	-58.1	*	4.1	7.5
C 20 Manufacture of chemicals and chemical products	2.1		60.3	***	6.0	7.9
C 21 Manufacture of basic pharmaceutical products and preparations	23.7	**	32.4	**	1.4	3.3
C 22 Manufacture of rubber and plastic products	14.1	**	49.6	*	2.2	2.6
C 23 Manufacture of other non-metallic mineral products	-6.3		9.9		1.2	1.0
C 24 Manufacture of basic metals	19.8		35.8	*	11.2	12.7
C 25 Manufacture of fabricated metal products	16.3	**	9.1		2.1	2.9
C 26 Manufacture of computer, electronic and optical products	6.1		35.4		17.2	5.5
C 27 Manufacture of electrical equipment	29.7	***	36.1	*	4.3	5.5
C 28 Manufacture of machinery and equipment n.e.c.	2.6		37.6	*	12.9	14.2
C 29 Manufacture of motor vehicles, trailers and semi-trailers	52.3	***	-72.9	***	2.1	4.9
C 30 Manufacture of other transport equipment	87.0	**	-38.5		1.5	1.8
C 31 Manufacture of furniture	-11.0		-40.1	**	1.4	1.3
D 35 Electricity, gas, steam and air conditioning supply	-73.2	**	..		0.4	0.0
Observations	872,334		872,334			
R-squared	0.990		0.990			

Note: Clustered standard errors. For reasons of multicollinearity, the estimates for Finland in three sectors (A 02 Forestry and logging, C 18 Printing and reproduction of recorded media, and D 35 Electricity, gas, steam and air conditioning supply) we not computed. *** p < 0.01, ** p < 0.05, * p < 0.1.

To summarise the effects on the Finnish sectors, the results indicate that EU FTAs have benefitted exports by Finnish forest industries, forestry and logging, in particular, and to a lesser extent, some chemical and metal industries. Similar to the results for the EU, these results are in line with the theory of comparative advantage.

Despite the positive effect on forest industry exports, the share of wood, pulp and paper products in the total value of Finnish goods exports declined considerably between 2004 and 2016. Although Finland has a comparative advantage in these products, the world market in these goods has grown much more slowly than in other industries (see e.g., Kaitila et al., 2018). This decline in relative market size has dominated FTA developments. In contrast, the shares of chemical industries, other machinery and equipment, basic metals, and transport equipment have increased in the total value of Finnish goods exports. The global markets for these industrial products have expanded quickly.

5.3.5 Services trade

In this subsection, we analyse the effects of FTAs on the service trade. As previously noted, we were not able to include the exports and imports of services in the sectoral analysis discussed in section 5.3.4. Instead, we analyse the effects on services trade separately. The trade in services has become increasingly important in Finland. For example, the Finnish Customs and Statistics Finland (Tulli, 2017) reported that in 2015, the value of services exports in the balance of payments statistics was 23.4 billion euros,[15] and the total exported value of goods and services was 77.2 billion euros.

Compared with the analysis of trade in goods, the analysis of the general effects on trade was more challenging. As explained in detail in Chapter 5.2., our services trade data was limited, and many values and zero values were missing. Because many EU FTA partners are small and/or developing countries, the services trade is often low and poorly recorded. Therefore, it is not surprising that most estimates of trade effects were not statistically significant, as shown in columns 1,2 and 3 in Table 5.3.10. The results of the analysis of all the EU's trade agreements showed that none of the estimated coefficients were statistically significant. The same results were found for the coefficients of the general RTA and EU accession variables.

[15] The sectors that we analyse in this section—agriculture, forestry, manufacturing and energy production—played a major role in the trade of services. In total, they exported 45.5 billion euros worth of goods and 10.0 billion euros worth of services or 72 per cent of total exports. Their share of all exported services was 43 per cent. The most important service sectors exporting service products were transportation and storage and information and communication.

Table 5.3.10 The effects of EU FTAs on services trade, 2000-2017

VARIABLES	(1)	(2)	(3)	(4)
EU FTA -EU as importer	-0.103	-0.0982	-0.101	-0.227**
	(0.0834)	(0.0839)	(0.0851)	(0.0958)
EU FTA -EU as exporter	-0.107	-0.102	-0.105	-0.182
	(0.0879)	(0.0883)	(0.0897)	(0.126)
EU		0.0490	0.0468	0.0250
		(0.0599)	(0.0604)	(0.0618)
Other RTAs			-0.0140	-0.00485
			(0.0320)	(0.0306)
EU FTA with Korea - EU as importer				0.170*
				(0.0935)
EU FTA with Korea -EU as exporter				0.0360
				(0.0692)
Observations	95,321	95,321	95,321	95,321
R-squared	0.989	0.989	0.989	0.989

Notes: Robust standard errors, clustered by pair-id, are in parentheses. All specifications include im-porter-time, exporter-time and pair-fixed effects. The fixed effects are not reported for brevity.

The results for the services trade should be interpreted with caution because of the data limitations mentioned earlier. It should also be kept in mind that many EU FTA partners that signed agreements from 2000–2017 were small, middle-income countries with less developed trade in services. Only three partner countries—Mexico, South Korea and Canada—traded relatively more services with EU countries (see Table 4.1.12 in Chapter 4). Because the agreement with Canada was not enforced until 2017, and its effect was observed for only one year. The agreement with Mexico included services was enforced in 2000, but it was less comprehensive than the newer agreements were.

Thus, we next applied a focused approach to study the special case of the effects of the EU–South Korea FTA.[16] This agreement is an example of the EU's most recent FTAs, which are generally more comprehensive than the older ones are. Moreover, the effects of service trade liberalisation in the former are likely to be stronger than in the latter. Although our EU trade agreement variable did not directly show whether services were included in the agreement, it is known that the EU–South Korea FTA provides wide coverage and a well-defined inclusion of service trade liberalisation.

[16] A broader, but more indirect analysis of the role of services in FTA-induced trade, is provided in section 7, where we discuss the role of services in the corresponding production value chains of goods.

The new trade agreements that are currently being negotiated are similar, so the FTA with South Korea provides a basis for estimating the possible effects on services of future agreements.

In Table 5.3.10, column 4 shows that the estimated coefficient for the EU–South Korea FTA was positive and statistically significant at 10 per cent when the EU was the importer. For exports to South Korea, the coefficient was positive but not statistically significant. According to the European Commission, both imports and exports of services from and to South Korea have increased significantly since the FTA was enforced in 2011. According to our results, the actual contribution of the FTA to the increase in imports was approximately 19 per cent.

In separating the effects of the EU–South Korea agreement, the trade agreement coefficient of the rest of the agreements was statistically significant and negative. This result indicates that the FTA with Korea had a relatively strong weight in our results. The likely reason is that the service trade volume with South Korea is high compared with many other EU trade agreement partners. In addition, it has been better recorded than in many other cases. The negative significance of the other agreements could be partly attributed to the fact that they do not always include service trade liberalisation.

The results for South Korea suggest that more recent treaties, which are more comprehensive than previously, may have positive effects on the services trade, at least when the partner country is a more developed country with higher services trade, such as South Korea. Therefore, the expected effects are potentially larger on services trade with Japan and Singapore, which already have more extensive trade in services with the EU (see Table 4.1.12).

The insignificant effects of EU's FTAs on services trade could also have hidden some dynamic effects. To determine this possibility, we estimated the effects by including dummy variables for an anticipation effect (i.e., 5 years before the enforcement of the agreements) and for lagged effects (i.e., 5 and 10 years after the enforcement). The results shown in Table 5.3.11 indicate that there was indeed an anticipation effect on trade services in imports and exports when the agreement was negotiated and signed but not yet enforced. These results suggest that it was not the actual agreement but the expectations of deepened trade relations that boosted services trade between the EU and its FTA partners. However, the negative significance of the contemporary and lagged effects indicate that service trade imports and exports decreased after the agreements were enforced. This fallback effect may be the reason that the overall effect on services exports and imports was statistically insignificant.

Table 5.3.11 The effects of EU FTAs on services trade with dynamic effects, 2000-2017

VARIABLES	(1)	(2)	(3)
EU FTA -EU as importer	-0.0947	-0.0887	-0.0916
	(0.0600)	(0.0606)	(0.0616)
EU FTA -EU as importer LEAD5	0.118**	0.119**	0.118**
	(0.0577)	(0.0578)	(0.0576)
EU FTA -EU as importer LAG5	-0.122*	-0.122*	-0.123*
	(0.0702)	(0.0702)	(0.0702)
EU FTA -EU as importer LAG10	-0.0737	-0.0739	-0.0742
	(0.0655)	(0.0655)	(0.0655)
EU FTA-EU as exporter	-0.144**	-0.138**	-0.141**
	(0.0656)	(0.0659)	(0.0671)
EU FTA-EU as exporter LEAD5	0.206***	0.207***	0.207***
	(0.0428)	(0.0429)	(0.0427)
EU FTA-EU as exporter LAG5	-0.101	-0.101	-0.101
	(0.106)	(0.106)	(0.106)
EU FTA-EU as exporter LAG10	-0.0140	-0.0146	-0.0147
	(0.0651)	(0.0651)	(0.0651)
EU		0.0569	0.0540
		(0.0596)	(0.0601)
RTA			-0.0186
			(0.0312)
Observations	95,321	95,321	95,321
R-squared	0.990	0.990	0.990

Note: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

5.4 Summary

In this chapter, we have estimated the effects of EU FTA on the EU and Finland. The results show that the EU FTA agreements that came into force after 1988 have increased the exports and imports of EU countries. These results suggest that trade agreements with the maximum level of coverage have increased EU's exports to the partner countries by approximately 34 per cent and imports by approximately 14 per cent. A possible reason for the smaller effect on imports is that most countries that had signed an agreement with the EU had already enjoyed low trade restrictions in their exports to the EU. Therefore, the EU FTAs had a larger effect on the restrictions faced by EU countries that exported to partner countries. The results of the analysis of the dynamics of the effect showed lagged effects on both imports and exports. The agreements may include transition periods that could explain these lags. Regarding imports, the GSP agreements could have affected the immediate effects.

The estimated effects on the exports and imports of Finland were different from the EU average. The aggregate results did not show statistically significant effects on Finnish exports to FTA partner countries; moreover, the effect on imports from FTA partner countries was negative. The absence of a positive effect on exports could be explained by the fact that many partner countries are not important export destinations for Finland. Only Turkey, Mexico, South Korea and Canada are relatively important Finnish export destinations among the FTA partner countries that have signed contracts after Finland joined the EU in 1995. The Finnish exports to these partner countries have increased, which was indicated by an overall increase in trade due to globalisation rather than by EU FTAs.

Furthermore, the results for the effects by industry showed that the average effect hid large sectoral variations. In Finland and the EU, the effects of FTAs were positive in some industries but negative in others. The sectoral results showed that FTAs had increased exports from Finland in some sectors, such as forest industries, and to a lesser extent in the chemical and metal industries, which have a comparative advantage in Finnish exports. The same results were shown at the EU level: high-tech metal and chemical industries with a comparative advantage had benefitted from the liberalisation of trade.

Regarding imports, the results showed that the FTAs had decreased Finnish imports from partner countries, particularly the goods produced in the following manufacturing sectors: machinery and equipment, rubber and plastic products, other non-metallic mineral products and fabricated metal products. In contrast, the effects on Finnish imports from partner countries were positive in goods produced by the manufacturing of transport equipment other than motor vehicles, electrical equipment, chemicals and chemical products, and basic pharmaceutical products and preparations.

We predicted the effects of new FTAs between the EU and Japan, Singapore and Vietnam as well as the updated agreement with Mexico. We used a general equilibrium gravity model that allows for counterfactual scenarios of different hypothetical trade agreements. The results suggest that Japan, Singapore, Vietnam and Mexico will benefit the most from their respective EU FTA agreements. This result is expected because the EU economy is larger than any of these partners. Regarding EU countries, on average, the EU–Japan FTA is expected to have the largest effect on the EU's imports and exports. This result was expected because among the new FTA partners, Japan has the largest trading volume with the EU.

Regarding the effects on Finland, the results suggest that all four new FTAs considered will increase both exports and imports. These results contrast the estimated ex-post effects, which showed negative effects on imports. The effects of the FTA with Japan are the largest on both Finland and the EU. The EU FTA with

Singapore is expected to generate some positive effects on Finnish exports and imports, whereas the results showed that the FTAs with Vietnam and Mexico are not expected to affect trade with Finland to a large extent.

Finally, we estimated the effects of the EU FTAs on the services trade. The FTAs that were enforced during the estimation period did not show statistically significant effects on the services trade. A plausible explanation for these insignificant effects is that many FTA partners that signed agreements during the estimation period are small, middle-income countries with less developed services trade. Only three partner countries, Mexico, South Korea, and Canada, trade more services with the EU. These countries have new FTAs that are generally more comprehensive than the older ones.

In analysing the most recent FTAs to determine whether they have significant effects on the services trade, we distinguished the effects of the EU–South Korea FTA, which was provisionally applied in 2011 and came into force in 2015. Regarding the EU–South Korea FTA, the results showed that services imports increased by approximately 19 per cent following the agreement. The results for South Korea suggest that recent treaties, at least with Japan and Singapore (which already had extensive trade in services with the EU), indicate considerable positive effects on the trade in services.

6 The Effects of EU FTAs on Foreign Direct Investments

6.1 The estimation model

In this section, we discuss the effects of EU FTAs on FDI flows between the EU and partner countries based on the results of the gravity model. Although the gravity model has been applied conventionally to analyse the trade flows of goods and services, it can also be used to study FDI flows. Indeed, it has been shown to provide a good fit in explaining variations in FDI volumes (Kleinert and Toubal, 2010). Because the agreements increase the economic proximity of partner countries through lowering the cost of trade, protecting investments, and fostering economic competition, they may also increase firms' cross-border transfers of production and its stages, thus increasing FDI flows.

In our examination FDI flows, we adjusted the gravity model to take into account the factors that could affect FDI compared with the trade flows of goods and services. For this reason, we included traditional gravity variables, such as market size (GDP), distance and common language, to control for the time-invariant, country pair-specific factors that affect FDI. Moreover, we controlled several other factors that affect FDI flows between countries but are not typically included in the gravity model of trade. These factors, which include the host country's GDP growth, trade openness and political freedom, may explain its attractiveness for foreign investment. In addition to trade agreements, FDI is also regulated by bilateral investment treaties (BIT), which we included in our specifications. The gravity model and the estimation models of FDI are presented in the Appendix.

6.2 Data

FDI data have similar limitations as service data do (see section 5.2); that is, country and time coverages are limited by gaps in the data. To alleviate these limitations, we have combined two sources of FDI data to obtain the best possible coverage and narrow the study period to 2000–2017, which enabled us to include as many countries as possible similar to the service trade analysis. First, we used data from the OECD[17]

[17] https://stats.oecd.org/Index.aspx?DataSetCode=FDI_FLOW_PARTNER#

that includes both FDI inflows and outflows in 34 OECD member countries. These data includes most partner countries in the world, but many observations are missing, particularly on smaller countries. Because of the asymmetrical nature of the OECD data, we used inflow data and then mirrored the outflow data to create balanced FDI flows.

Second, we complemented the OECD data with UNCTAD's Bilateral FDI Statistics dataset, which has a better country coverage than the OECD data has; however, data are available only for 2001–2012. Because FDI flow values are given in the same currency units, filling the gaps caused by missing observations was straightforward. The combined data covers 2000–2017 but is still limited. Therefore, we estimated the FTA effects only for the entire EU, and not Finland separately.

The data used for the gravity variables were collected from several sources. The data on distance were collected from CEPII's GeoDist database. For the GDP, GDP growth, and trade openness variables, we used data collected from the World Bank's World Development Indicators. The freedom dummy variable is the mean of the political rights and civil liberties ratings from Freedom House. The RTA and EU dummy variables were constructed in the same way as in the previous analysis (see section 5.3). For the BIT dummy variable, we used United Nations Conference on Trade and Development's (UNCTAD) International Investment Agreements Navigator to construct a database of BITs that are currently in force.

We used three-year averages of the FDI flow data to smooth the fluctuations in the data. All other variables were three-year averages, except the BIT, RTA, and EU dummy variables, which were positive from when the agreement was first in force. In these three dummy variables, we included only agreements that came into force after 2002, which was the first year in our sample after considering the intervals.

6.3 Results

Table 6.3.1 presents the results of the estimation using the gravity model of FDI flows. Column 1 shows the estimation results for the baseline model. The results for the main variable of interest, an FTA with EU as source and an FTA with EU as host country, are mixed. For the EU as a source of FDI, the regression estimates imply that the maximum value of the trade agreement index (RTA = 1, all provisions are in the agreement) was associated with a 35% increase in FDI flows. However, when the EU was the host of FDI, the estimated coefficient was negative, suggesting a decrease in FDI in partner countries with the EU. The results of the estimates also indicate that EU membership had the strongest effect on FDI among the trade agreement related

variables. Moreover, EU membership increased FDI flows between the members by 103 per cent. The results of estimates of bilateral investment treaties and trade agreements in general show that the RTAs were all positive and statistically significant, which suggests positive effects on FDI.

Table 6.3.1 The effects of EU FTAs on FDI, 2000-2017.

VARIABLES	(1)	(2)	(3)	(4)
Ln(Distance)	-0.536***	-0.537***	-0.536***	-0.536***
	(0.0535)	(0.0526)	(0.0520)	(0.0520)
Shared border	0.0759	0.0762	0.0788	0.0788
	(0.127)	(0.126)	(0.127)	(0.127)
Common language	-0.174	-0.176	-0.177	-0.177
	(0.112)	(0.111)	(0.110)	(0.110)
Ever in a colonial relationship	0.393***	0.393***	0.392***	0.392***
	(0.104)	(0.100)	(0.0974)	(0.0974)
Ln(GDP of host country)	1.141***	1.285***	1.304***	1.308***
	(0.162)	(0.178)	(0.183)	(0.184)
Ln(GDP of source country)	0.865***	0.886***	0.893***	0.894***
	(0.238)	(0.237)	(0.237)	(0.237)
Bilateral investment treaty	0.275**	0.269**	0.272**	0.270**
	(0.110)	(0.109)	(0.109)	(0.109)
EU FTA- EU as source	0.303*	0.321*	0.330*	0.332*
	(0.180)	(0.180)	(0.180)	(0.180)
EU FTA- EU as host	-0.359**	-0.357**	-0.372**	-0.370**
	(0.169)	(0.170)	(0.174)	(0.174)
EU	0.709***	0.705***	0.700***	0.703***
	(0.173)	(0.177)	(0.181)	(0.180)
Other RTAs	0.367***	0.372***	0.389***	0.389***
	(0.117)	(0.116)	(0.116)	(0.116)
GDP growth rate of host country		0.0550**	0.0472**	0.0478**
		(0.0219)	(0.0207)	(0.0207)
Openness of host country			0.449	0.440
			(0.359)	(0.360)
Freedom House index of host country				0.0626
				(0.113)
Observations	29,955	29,955	29,724	29,553
R-squared	0.573	0.585	0.589	0.590

Note: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

The results also show that as expected, the estimated coefficients of the host and source country GDPs are positive and statistically significant, which suggests that larger countries both invest more in foreign countries and receive more investments from other countries. For example, a 10 per cent increase in the host country's GDP increased FDI flows by 11 per cent in our estimations.[18] The coefficient of distance is negative and statistically significant, which suggests that FDI flows are smaller between countries that are geographically remote.

In Table 6.3.1, columns 2–4 show the results of the specifications, including the additional control variables. The addition of these variables did not greatly affect the coefficients of interest. As expected, the estimated coefficient of the GDP growth of the host country was statistically significant and positive, but its size was small. The openness of the host country and the freedom index were not statistically significant.

6.4 Summary

The results indicate that EU FTAs have increased the FDI outflows of EU countries to partner countries, but not the FDI inflows from partner countries. There are several plausible explanations for the latter result. First, it is possible that the insignificant effect of the EU FTA on FDI inflows could be explained by the lack of data on FDI inflows to EU from RTA partner countries. Most of these data were either missing or zero, which makes it difficult to estimate the effects of RTAs on FDI flows. Second, many of the small and less developed partner countries had zero or small FDI outflows. Thus, while we acknowledge the limitations of the data, the results showing weak capital imports were broadly consistent with the weak general effect of the agreements on EU imports in general, as discussed in Chapter 5.

[18] In the logarithms of continuous variables, the interpretation of the estimated coefficients was the elasticity of the FDI flows with respect to the continuous variable. The coefficients of binomial dummies, such as *BIT*, were interpreted differently using the transformation $(e^{\beta_i} - 1) * 100$ to obtain the percentage changes.

7 EU Free Trade Agreements and Global Value Chains

In the modern world economy, production is fragmented in global value chains. Consequently, the effects of the EU's FTAs are likely to extend far beyond the direct effects of direct bilateral trade. Because of the complexity of production linkages, it is important to analyse global input–output flows to trace the total value of FTAs for the economies of Finland and other countries. For example, Finland may produce intermediate goods and services for German cars that are exported to FTA partners from Germany. This linkage may increase the value of FTAs for Finland if they increase the sales of German cars. Moreover, Finnish production is likely to use intermediate goods and services from third countries, including countries outside the FTA area. Thus, to fully understand the value of FTAs for the Finnish economy, it is important to measure the Finnish value-added stake in and beyond the bilateral (gross) effects of trade.

We applied a measurement framework to analyse the total effects of value chains in FTAs. We based this approach on the so-called hypothetical extraction method. This method is based on the input–output representation of the global economy (Los, Timmer and de Vries, 2016). This approach is economically intuitive, and it was easily applied to the data. It compares the actual GDP in a country with a hypothetical GDP in cases where all the bilateral effects of FTAs are removed. The bilateral effects were estimated using our sectoral gravity model after which the global input–output tables were used to extract the total amount of value added in all production stages involving intermediate goods and services that were embodied in these bilateral trade flows. To yield the total value-added content of the FTAs, the difference between the actual value added and the value added without FTAs was then measured.

Our work is relevant for the literature on links between global value chains and the effects of FTAs. According to the literature, value chains may significantly contribute to the effects of trade agreements, but these effects greatly depend on the specificities in the FTAs. Johnson and Noguera (2017), Mulabdic et al. (2017), Orefice and Rocha (2014) and Osnago, Rocha and Ruta, 2015, 2016) conducted empirical studies on the effects of trade agreements on value-added trade flows using various trade agreement depth indices, gravity specifications and panel datasets. The results were mixed. Orefice and Rocha (2014) and Mulabdic et al. (2017) also explored the distinctions between intermediate and final gross trade flows.

Comprehensive integration strategies are required to ensure the smooth functioning of Global Value Chains (GVCs) (Sampatha and Valleboj, 2018). Different forms of interfirm relationships along the chain can determine the access to international markets and technologies as well as capability building (Gereffi, 1999; Pietrobelli, 2008; Pietrobelli and Rabelloti, 2011). Moreover, functioning domestic and international institutions have crucial implications for how firms organise production and distribution within GVCs (Eckhardt, Poletti, 2018). Sampatha and Valleboj (2018) argued that in countries that successfully use trade agreements to promote trade, firms rely on multiple attributes of the innovation system to leverage knowledge flows within and outside GVCs to build export capacity and diversify horizontally into new GVCs. Moreover, processes aimed at lowering the cross-country barriers to GVCs, such as by standard-setting initiatives, are important and likely to be effective when they involve active public policies (Eckhardt and Poletti, 2018).

It is worth noting that our analysis comprised an accounting exercise that measured the effects on value chains of the changes in trade due to FTAs, ceteris paribus. That is, it allowed us to measure the value-added effects under the existing value chains and economic behaviour. However, it is possible that the underlying economic conditions may adjust to changing conditions. In the next chapter, we consider these dynamics in our macroeconomic model.

Recently, Dhingra et al. (2018) and Laget et al. (2018) showed empirically that the depth of trade agreements greatly influences their effects. They analysed complementary rules, such as market access, the regulation of foreign service providers and the promotion of competition among domestic and foreign businesses, which often extend the effects of trade agreements beyond lowered trading costs. Dhingra et al. (2018) found that by using a gravity model that included provisions related to services, investment, and competition made up half of the overall impact of economic integration agreements on trade flows. The contribution was often observed in services, especially in sectors that facilitated supply chain activity, such as transportation and storage. Laget et al. (2018) found that the positive effect of deep trade agreements was higher in higher value-added industries, which suggests that deep agreements help countries to integrate industries with higher levels of value added.

7.1 A non-technical description of the methodology

The mathematical details of our analysis are described in the Appendix. Here, we briefly describe its key elements. In terms of the bilateral trade effects of FTAs, we use the sectoral gravity model (see Chapter 5) and combine information from several estimations. In the case of bilateral trade flows that directly involved Finland, we measured the effects of FTAs using the predictions in the Finland-specific gravity model. If the trade did not directly involve Finland but other EU countries and FTA partner countries, we used the estimated average trade elasticities of the EU countries. Hence, we were able to provide a detailed description of the trade effects without burdening our gravity models with an excessive number of estimable parameters.

As discussed in Chapter 5, the sectoral trade data used to estimate the gravity model, included data from 2004 onwards. Therefore, the estimated effect of FTAs at the sectoral level was based on EU trade agreements that came into force after 2004 (see Chapter 4 for a list of these FTAs). Thus, in our analysis, we focused on the role of these agreements.

However, because many important agreements came into force before 2004, we also extrapolated the predictions of our model to forecast the effects of these previous EU FTAs. Although we did not have direct information about their implementation, the extrapolated values indicate the total magnitude of the FTAs based on the effects on trade of recent agreements. In practice, using our sectoral data, we first estimated the average percentual effect of the post-2004 FTAs on bilateral trade and then extended these effects to the agreements that were signed before 2004.

In our analysis, we used the 2016 WIOD database (Timmer et al., 2015, 2016). The data contain sector-level world input–output tables (WIOTs) showing underlying data on 44 countries and 56 sectors, including services.[19] These countries accounted for more than 85% of the world's GDP at the current exchange rates. WIOTs are based on national accounts data, which are extended by means of disaggregating imports by

[19] The countries were chosen by considering whether there was a sufficient level of data availability and by attempting to include a major part of the world economy. The selected countries included 27 EU countries and 15 other major countries. Data on the 56 sectors are classified according to the International Standard Industrial Classification Revision 4 (ISIC Rev. 4). The tables adhere to the 2008 version of the System of National Accounts (SNA). The dataset provided WIOTs using current prices denoted in millions of US dollars (Timmer et al. 2016).

country of origin and using categories to generate international supply and use tables (Timmer et al., 2016).

Next, we describe how the data were transferred between the gravity model and the WIOD data. When applied to the global context, the gravity model provides an estimate of the percentual change in the value of trade of all bilateral trade flows involving FTAs.[20] We collected these estimates for 2016, which was the latest observation year in our sectoral data. We then imported this information to the WIOD data and constructed a set of counterfactual bilateral trade flows that represented a world without FTAs. The counterfactual flows were constructed by altering the trade flows in the WIOD data according to the percentual changes of trade that were forecasted by the gravity model. We altered the trade flows of final and intermediate goods in the same proportions, and we used the latest available WIOD data from 2014 to build the counterfactual value added.

It should be noted that the transfer of information between the gravity model predictions and the WIOD data required aggregation. The WIOD data include only 43 countries, while all other countries are aggregated in the rest-of-the-world (ROW) category. Therefore, all changes in the bilateral trade flows in the gravity model that occur within the ROW category of the WIOD dataset had to be aggregated. In these cases, we used the magnitude of the corresponding bilateral trade flows to weight the relative changes of trade within the ROW category.

Finally, the recent literature proposes an alternative method for dealing with value added (VA) trade. In this method, VA streams are directly used as explained variables in gravity models to make inferences about the effects of trade agreements on trade. That is, the role of various industries in generating value added in bilateral trade relations is first assessed, and then these value-added streams are explained using a gravity model.

However, in our study, we first estimated the effect by using gross trade flows and then examining the implications of their value chains. The main reason is that EU trade agreements are often made with small countries that cannot be directly observed in the WIOD data, which includes only 43 individual countries; the remainder are aggregated in the ROW category. Thus, we first used detailed gross trade data to estimate the effects of small country trade deals on gross exports (i.e., disaggregated data) and then inserted this information in the WIOD data in the second stage. Another benefit of this approach is that it enabled us to determine how

[20] The number is obtained by first forecasting the model's prediction of the trade flow, after which the FTA -dummies are set to 0, and the prediction is repeated. This procedure yielded the effect of the FTAs as the difference in the predictions.

changes in various bilateral gross trade relations indirectly affected value-added trade in other trade linkages.

7.2 Results

In this section, we report the results showing the value-added effects of EU FTAs. We separately estimated the effects of the FTAs that were signed after 2004 (for the list of agreements, see section 4). These agreements were our sectoral data and therefore their effects were directly drawn from these data. To provide an extended approach, we also extrapolated the results to involve all EU FTAs. Because of the extrapolated nature of the estimates, the effects of all agreements may not accurately represent their importance. [21] The following results showed the annual changes in the trade-induced value added by the FTAs, which is reported in euros (2014).

Table 7.1. shows the results of the Finnish value-added content of the trade explained by the FTAs. The table shows the aggregate value-added effects as well as the separated findings for the top 10 trade routes. [22] We characterised the trade routes based on the producer of the final good and showed them in ascending order according to their total FTA-induced value-added effect.

The results showed that the total amount of Finnish value-added in FTAs that were signed after 2004 was roughly 0.75 EUR billion (Table 7.1 column a).[23] This number was 1.6 per cent of all Finnish value-added exports. The rough estimate of the employment effect based on industry-level employment output shares indicated that the corresponding production required approximately 10,000 employees in Finland.

The division of the value added by the final producers revealed that it was generated mainly by products for which the final assembly was outside Finland. The Finnish value added that was generated in the production of Finnish final goods was only 19.7 per cent of the overall Finnish value added. The results showed that final assembly

[21] As already mentioned, we only observed the agreements in force, and thus we could not use them to directly identify the impact. Instead, we used the signing of newer agreements to predict the impacts of the older agreements.
[22] This estimate was based on the global value chain matrix representation of trade that decomposes value added by the producer of the final good (e.g., Timmer et al. 2015).
[23] In short, this number was obtained by comparing the Finnish total value added in all EU FTAs signed after 2004 and in a counterfactual scenario without them. In the counterfactual scenario, all bilateral trade flows that were affected by the agreements were modified based on the predictions of the sectoral gravity model.

was often done in small partner countries, which was indicated by the large ROW category in the WIOD database.

In addition to Finland, the largest individual final-assembly countries using Finnish intermediates were Korea, China and the US. In the cases of China and the US, the numbers reflected an FTA-induced increase in the trade of intermediate products with the EU's FTA partners, such as Korea. In these cases, the Finnish value-added was embodied in products for which final assembly was done outside the sphere of these FTAs, which indicates the complexity of value chains and the importance of indirect trade linkages.

Table 7.1. The Finnish value-added contribution to the increase in trade explained by EU FTAs by the producer of the final good or service, EUR millions, top 10 and aggregate effect.

(a) FTAs after 2004		(b) All FTAs	
ROW	315.3	ROW	529.5
FIN	147.6	FIN	311.3
KOR	144.8	NOR	176.7
CHN	37.0	KOR	149.3
USA	17.9	TUR	107.1
DEU	11.5	CHE	70.7
JPN	10.9	CHN	56.9
FRA	7.8	DEU	39.7
IND	6.2	USA	38.5
ITA	3.9	MEX	28.8
All countries	748.7	All countries	1 696.7

As shown in Table 7.1 column (b), when we extended the analysis beyond the latest trade agreements, the results showed that the overall value added was more than doubled to almost 1.7 billion EUR (i.e., 3.8 per cent of all Finnish value-added exports). Thus, our estimate of the effects of older FTAs was 0.9 billion EUR. The effect was due to the inclusion of several important trade agreements, such as those with Norway, Turkey and Switzerland.

However, the importance of Finnish final products remained relatively scant. The value added associated with the domestic final goods remained around 0.3 billion, which was only 18.3 per cent of the total value-added increase in trade explained by the FTAs. The estimate of the employment effect based on industry-level employment output shares indicated that the production of all FTA-induced exports required approximately 23,000 employees in Finland.

We then analysed the Finnish value-added effects of EU FTAs at the industry level. Table 7.2 shows the total value added of all industries divided according to the producer of the good or service. It should be noted that the value added could have been generated in either final or intermediate-level production. The table also provides a list of the top 10 industries in ascending order according to the total value added generated.

We first report the results for EU FTAs that were signed after 2004, as shown in column (a) in Table 7.2. The results showed that gains in value added in many of the largest industries were related to the increased production of forest products. Forestry and logging experienced the largest impact; its value added increased by 0.2 billion EUR. Regarding manufactured wood and paper products, the total value-added contribution of the EU FTAs increased by roughly 0.1 billion EUR. The total was approximately 30 per cent of the total EU FTA-induced value added in Finland. Another important field of production was the manufacture of machinery and equipment.

Our gravity model was estimated using manufactured goods. However, it should be noted that a large fraction of the value added in their production was generated by trade, transportation and business services. The service sector generated roughly 0.2 billion EUR of value added or 25.6 per cent of the total value added of all values added generated in Finland by EU FTAs.

We also examined the value added generated by previous EU FTAs for Finnish industries. The results showed that the industry-level effects of trade agreements were similar to all FTAs. Moreover, in this case, forest products, machinery, equipment production, and various services were significant factors.

We then analysed the value-added effects of FTAs on other countries. The results of the analysis at the EU level showed that the total value-added effect was roughly 47.6 billion EUR for the EU’s post-2004 FTAs (i.e., 2.0% of total value-added exports) and 137.6 billion EUR for all EU FTAs (i.e., 3.0% of total value-added exports). In comparison, the EU’s average impact was close to the effect on the Finnish exports in relative terms; however, regarding the new agreements, Finland ranked moderately below the average.

We analysed the effects on the individual-country level. The ranking of countries in terms of the relative importance of the EU's FTAs showed that the new EU member states had experienced the highest effects of agreements in joining the EU.[24] In Croatia and Bulgaria, the effects exceeded 10% of their value-added exports. Among the older member states, Greece, Spain and Great Britain increased value-added trade substantially because of the EU's FTAs. When the previous FTAs were considered, the distribution remained similar, while the average effect was moderately increased. Less effects were found on EU's partners in FTAs, such as Korea, Norway and Taiwan.

In comparison, Finland was ranked relatively high. However, this result was mainly due to the Finland-specific modelling of trade elasticities. When the common model of all EU countries was applied to Finland, its ranking decreased to the middle of the distribution. Although our focus was on the Finnish value added, this finding suggests that inferences based on the average EU effects on other countries should be made with caution.

Finally, we examined the EU's value-added by the contributing industries. The results are shown in Table 7.3. They suggest that the value-added effects of EU FTAs were particularly strong in the mining and quarrying industries. These substantial effects explained almost 40 per cent of the total creation of value added and corresponded with a large FTA-induced effect in our gravity model. The results also showed the substantial role of the manufacture of motor vehicles, trailers, semi-trailers, and other transport equipment. Trade and business services were also present in our list.

[24] It is notable that this effect was different from the effect of joining the EU, which solely arises from the change in FTA statuses that are commonly estimated, on all EU member states.

Table 7.2. The Finnish value-added contribution to the increase in trade explained by EU FTAs by the producer industry of the final good or service, EUR millions.

(a) FTAs after 2004		(b) All FTAs	
Forestry and logging	156.1	Forestry and logging	226.2
Manufacture of machinery and equipment n.e.c.	91.2	Manufacture of machinery and equipment n.e.c.	205.8
Manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials	39.2	Manufacture of paper and paper products	101.8
Manufacture of paper and paper products	36.9	Manufacture of computer, electronic and optical products	92.0
Manufacture of computer, electronic and optical products	34.7	Crop and animal production, hunting and related service activities	89.0
Wholesale trade, except of motor vehicles and motorcycles	32.4	Manufacture of chemicals and chemical products	81.4
Manufacture of electrical equipment	31.7	Manufacture of electrical equipment	78.4
Crop and animal production, hunting and related service activities	30.9	Manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials	74.6
Manufacture of fabricated metal products, except machinery and equipment	27.9	Wholesale trade, except of motor vehicles and motorcycles	73.9
Manufacture of chemicals and chemical products	23.4	Land transport and transport via pipelines	55.0

Table 7.3. The EU's value-added contribution to the increase in trade explained by EU FTAs by the producer industry of the final good or service, % of the total value-added generated by the FTAs. TOP 10 industries.

FTAs after 2005		All FTAs	
Mining and quarrying	38.5 %	Mining and quarrying	36.4 %
Manufacture of motor vehicles, trailers and semi-trailers	6.3 %	Manufacture of motor vehicles, trailers and semi-trailers	5.7 %
Wholesale trade, except of motor vehicles and motorcycles	4.0 %	Wholesale trade, except of motor vehicles and motorcycles	4.5 %
Administrative and support service activities	3.6 %	Manufacture of other transport equipment	4.2 %
Legal and accounting activities; activities of head offices; management consultancy activities	3.4 %	Administrative and support service activities	3.6 %
Manufacture of other transport equipment	3.1 %	Manufacture of fabricated metal products, except machinery and equipment	3.1 %
Manufacture of fabricated metal products, except machinery and equipment	3.0 %	Legal and accounting activities; activities of head offices; management consultancy activities	3.1 %
Manufacture of basic pharmaceutical products and pharmaceutical preparations	2.4 %	Financial service activities, except insurance and pension funding	2.3 %
Manufacture of electrical equipment	2.3 %	Manufacture of electrical equipment	2.2 %
Financial service activities, except insurance and pension funding	2.3 %	Land transport and transport via pipelines	2.2 %

7.3 Summary

In this chapter, we discussed the results of the analysis of a measurement framework for the total value-chain effects of FTAs. The framework combined the predictions of increased trade explained by FTA flows to the so-called hypothetical extraction method, which is based on the input–output representation of the global economy. We compared the actual GDP in a country with a hypothetical GDP in cases where all the bilateral effects of FTAs were removed. Global input–output tables were used to extract the total amount of value added in all production stages that involved intermediate goods and services embodied in the bilateral effects.

Our results showed that in the post-2004 EU FTAs, the total Finnish increase in trade explained by FTAs amounted to 1.6 percent of all Finnish value-added exports. The rough estimate of the employment effect based on industry-level employment output shares indicated that the corresponding production required approximately 10,000 employees in Finland. When we extrapolated these results to include previous FTAs, the numbers more than doubled.

The division of the value added by the final producers revealed that it was generated mainly in products for which the final assembly was outside Finland. The Finnish value added generated in the production of Finnish final goods was only 19.7 per cent of the overall Finnish value added. In the post-2004 FTAs, the largest individual final-assembly countries, in addition to Finland, were Korea, China and the United States. the industry-level results showed that the greatest gains in Finnish value added were related to the increased production of forest products. Another important field of production was the manufacturing of various machinery and equipment. Although our gravity model was estimated using manufactured goods, it was notable that a large fraction of the value added in their production was generated by trade, transportation and business services.

Regarding the effect at the EU level, the results showed that the EU's post-2004 FTAs constituted 2.0 per cent of a country's total value-added exports; the same share was 3.6 per cent in all FTAs. Regarding the ranking of countries in terms of the importance of the EU FTAs, the results showed that new EU member states experienced the highest effects of the agreements by joining of the EU. At the EU level, the value-added effects of FTAs were particularly strong in the mining and quarrying industries. Other important fields were the manufacture of motor vehicles, trailers, semi-trailers, and other transport equipment as well as trade and business services.

8 The Effects of EU Free Trade Agreements on GDP

In this chapter, we report the results of the analysis of the general equilibrium effects of the EU FTAs on the Finnish economy. These effects were assessed by incorporating the results gained from the gravity model in a macro model that captured the relevant links between the macro variables in an economy. In this task, we used the gravity model's estimates of Finnish gross export effects as inputs in the ETLA macro model (Lehmus, 2018). Applying the macro model, we assessed the GDP effects as well as those on employment, productivity, private consumption, and investment. The results are discussed in the following sections.

8.1 The dynamic effects on the Finnish economy

The ETLA model is a structural econometric macro model that is termed a SSM (Semi-Structural Macromodel) or policy model in the recent literature. The ETLA model comprises 81 endogenous and 70 exogenous variables. The model encompasses Keynesian features in the short run, whereas its long-term equilibrium properties are defined on the supply side. A detailed description of the model, including a list of its equations, is provided in Appendix 8.1.

According to the results of the gravity model(s) discussed in Chapter 5, the EU FTAs increased total Finnish exports by 0.7–3.3 per cent, depending on the specifications in the gravity model. These were calculated by multiplying the estimates of the gravity model(s) by 0.1309, which in 2016 was the share of Finnish exports to countries that had ratified FTAs. This result was interpreted as 0.7 per cent and 3.3 per cent, which represented the lower bound of the estimate and 3.3 the upper bound of the estimate, respectively. The positive effects of trade deals were attributed to lower tariffs of imported and exported goods and services, which implied lower relative export and import prices in countries that had ratified trade deals. To simulate these effects in the ETLA macro model, we assumed that trade deals had lowered relative export and import prices to a degree that produced an increase in Finnish gross exports in the range from 0.7–3.3 per cent.

Increases in exports also boosted imports because imported goods were used as inputs in production. Imports were also likely to increase if the FTAs resulted in declines in import prices. Moreover, rising domestic demand led to increases in imports, implying a slight negative effect on GDP. Thus, the increases in exports and imports produced dynamic effects throughout the economy. The associated medium-term changes in macro variables are shown in Table 8.1.

Table 8.1. Dynamic effects of the EU FTAs in the medium term

Effect on	Trade deals associated with a 0.7 – 3.3% increase in exports
Domestic demand	
Private consumption	0.0 – 0.2 %
Private investment	0.1 – 0.6 %
Supply side	
Productivity	0.1 – 0.3 %
Employment	0.0 – 0.1 %
GDP	0.1 – 0.4 %

According to the macro model simulation, the increases in foreign trade enhanced labour productivity slightly in the medium term. The increase in productivity was related to the improved performance of the manufacturing sector; its share in total valued added was increased by the FTAs. The medium term was defined here as a 10-year period. Increases by 0.7–3.3% in gross export volume were due to changes in export and import prices, which was associated with a positive but modest 0.1–0.3% increase in labour productivity.

Furthermore, employment increased slightly in the medium term because of the trade deals associated with the 0.7–3.3% increase in Finnish gross exports. Nevertheless, the employment effect of around 0.0–0.1 per cent could described as very small. More importantly, the employment effects approached zero in the long run, which means that long-run increases in GDP were due to improvements in productivity.

Private consumption also benefitted slightly from the EU's FTAs. Higher exports generated domestic valued added and higher disposable incomes in households, which converted to a small increase in private consumption. Thus, the FTAs also slightly raised the domestic wage level, which was in line with the productivity gains achieved from these agreements. According to the simulations, private consumption was around 0.0–0.2 per cent higher in the medium term compared to the baseline, which represented an economy without trade deals. Because it indicates an aggregate effect, we cannot infer the distribution effects of consumption from this

result. The effect on private investments was also positive because they increased by 0.1–0.6 per cent because of the FTAs.

Overall, according to the macro model simulations the EU's trade deals modestly increased the Finnish GDP by around 0.1–0.4 % in the medium term. The increase in GDP was due to higher exports and private consumption, which was also reflected in the gradual improvement in household real incomes and labour productivity. Higher exports and private consumption also increased imports, which dampened the positive effect on the GDP. The medium-term positive effect on employment also slightly raised the GDP, but in the long run, the positive effects on the GDP were entirely due to increases in labour productivity.

However, if we had assumed that the FTAs affected export prices but not import prices, the effect of the FTAs on GDP would have nearly doubled. The reason is that imports would have grown by a much smaller extent, which was an effect of the FTAs. The change in assumption would have produced an overall increase of 0.2–1.0 per cent in the Finnish GDP in the medium term. This effect could have been interpreted as a pure multiplier effect achieved by the increase in gross exports. Nevertheless, it is plausible to assume that the import prices changed according to export prices, which was an effect of the FTAs.[25]

The results presented in Table 8.1 can be compared to those achieved using the value-added chain calculations discussed in Chapter 7. In general, the results were similar in magnitude although the macro model produced, on average, a slightly smaller positive GDP effect. This result could be attributed to the more pronounced import effect, which was due to not only an increase in exports and lower import prices but also an increase domestic demand, as estimated using the macro model.

The model simulation discussed here could not capture changes in demand from third countries——that is, countries that are affected by a trade deal though not direct participants in the deal. These kinds of effects, which are driven by factors such as the global value chains of firms, could have been better captured in the estimations presented in Chapter 7. However, according to our view, the magnitude of the difference in estimates presented in this section and in Chapter 7 is within a plausible range.

[25] In the simulation, we assumed that export prices declined by 0.8–3.8 per cent and import prices declined by 0.2–0.7 per cent as a consequence of the FTAs. This, however, represents a technical assumption made to produce the volume change in exports, which equals the estimated effect of the gravity model(s). Imports rose by c. 0.5–2.4 per cent as a result of the FTAs according to the model simulation.

8.2 Summary

In this section, we presented the results of the analysis of the effects of the general equilibrium of the EU's FTAs. The results of the gravity model were incorporated in a macro model that captured the relevant links between the macro variables in an economy. We used the gravity model's estimates of Finnish gross export effects as inputs in the ETLA macro model. According to the model simulations, the EU's FTAs modestly raised Finnish GDP by around 0.1–0.4% in the medium term. The increase in GDP was due to higher exports and private consumption, which was also reflected in a gradual improvement in household real incomes and labour productivity, which increased by 0.1–0.3%.

9 Conclusions

This report provides a comprehensive assessment of the economic effects of EU FTAs on the Finnish economy, its closest trading partners, and the entire EU. We have examined the influence on foreign trade and evaluated the effects on GDP, trade in value added, employment and FDI. Moreover, we separately measured the effects of existing trade agreements and new FTAs. The New FTAs with Singapore and Japan were recently ratified in 2019, and those with Vietnam and Mexico are pending ratification.

In this report, the economic effects of the EU's FTAs were estimated in several stages. First, we used a gravity model to assess both the ex-post effects of existing EU FTAs and the ex-ante effects of new EU FTAs on bilateral trade, trade between third countries, and real GDP. Second, we used the estimates of the gravity model to assess the effects of trade agreements on the value-added content of trade. Third, using the estimated gross export effects as inputs, we simulated the effects of the FTAs on the Finnish economy. Finally, we examined the effects of FTAs on bilateral inward and outward FDI between the EU and the FTA partner countries.

9.1 Summary of the trade results

Regarding the effects of trade, we did not find a statistically significant overall effect of EU FTAs that came into force since 1996 on Finnish aggregate exports. The absence of an overall positive effect on exports could be explained by the fact that many partner countries that have signed FTAs with the EU are not important destinations of Finnish exports. However, the average effect masked large sectoral variations. Our sectoral results showed that the EU's FTAs increased exports in some sectors where Finland had a comparative advantage, such as the forest industry, including forestry and logging and, to a lesser extent, the chemical and metal industries.

Regarding imports, we found an overall decrease in Finnish imports from the EU's FTA partner countries. However, the sectoral effects were heterogeneous. Negative effects were particularly strong in the manufacturing of machinery and equipment, rubber and plastic products, non-metallic mineral products, and fabricated metal products. In contrast, there was a positive effect of the EU's FTAs on Finnish imports in the manufacture of transport equipment, electrical equipment, chemicals and chemical products, and basic pharmaceutical products and preparations.

A surprising result showed that the EU's FTA agreements have not increased Finnish trade with partner countries. A plausible explanation for these negative or insignificant effects is the enlargement of the EU by ten CEECs in 2004 and 2007.[26] The trade relations between Finland and the other EU countries were affected profoundly by this change: The results implied that because of the geographical proximity and deep integration with the EU, trade with many of these countries increased more rapidly than trade with partner countries that signed FTAs with the EU during the same period.

In addition, we found a positive long-term trend in Finnish exports to some of the most important EU FTA partners of Finland: Turkey, Mexico and South Korea. However, the results of empirical analysis suggest that the increase in Finnish exports to the EU FTA countries was due to the general increase in trade caused by globalisation rather than by the EU's FTA agreements.

At the EU level, our findings suggest that EU FTAs that were entered into force since 1988 have significantly increased EU exports to FTA partner countries. They have also had a positive effect on imports. Overall, the results suggest that these effects are large. For example, the most comprehensive FTA increased EU exports to partner countries by about 34% and EU imports from partner countries by 14%. It is likely that the differences between the Finnish results and the EU results partly reflect the importance of the FTAs prior to Finland's membership in the EU.

Overall, the findings suggest that the EU's FTAs may have positively affected the EU's trade balance. However, while it is tempting to conclude that they have benefitted the EU countries even more, it is worthwhile remembering that an increase in imports to the EU may improve economic wellbeing if it lowered the prices of consumption and increased competition. Furthermore, the increased import of capital goods and parts of production may improve productivity and production capacity rather than replace domestic production, which is potentially important for middle-income and developing countries.

Regarding new FTAs, we found that the EU–Japan agreement is expected to have the largest impact on trade flows for both EU countries and Finland. This result was expected because Japan has the largest trade volume with the EU among the new trade agreement partners. Singapore was in the middle range in terms of trade effects, whereas the effects of the EU–Vietnam agreement were not as large on the EU as they were on Vietnam. Furthermore, based on the results, the update on the EU–Mexico agreement is not expected to have large trade effects, neither on the EU

[26] In 2004, Estonia, Czechia Latvia and Hungary.

nor on Finland. Our assessment of the effects of the EU's new trade agreements with Japan, Singapore and Vietnam and the updated agreement with Mexico indicate that these four countries will enjoy the largest effects of their respective FTAs compared with the EU countries.

We also examined the effects of the EU's FTAs on the service trade and FDI. Because of data limitations, these parts of the report are restricted to evaluating only the average effects on the EU.

Regarding service trade, we found no significant effects of the EU's FTAs. A plausible explanation for this result is that many EU FTA partners that signed agreements during the period from 2000–2017 were small, middle-income countries with less developed international service trades. Only three partner countries—Mexico, South Korea and Canada—had more extensive trade in services with the EU. Our analysis of the EU–South Korea FTA showed that services imports increased by approximately 19 per cent due to the agreement. The EU–South Korea FTA is an example of the EU's recent trade agreements, which are generally more comprehensive than previous agreements are. The results for South Korea suggest that recent treaties may have positive effects on the services trade at least with Japan and Singapore, which already had more extensive service trade with the EU.

9.2 Summary of the results for FDI, value-added chains and general equilibrium

The results of the analysis of FDI suggest that the EU's FTAs increase the FDI outflows of EU countries to partner countries but not the FDI inflows from the partner countries. The results showing weak capital imports were broadly consistent with the weak general effect of the agreements on EU imports.

These findings likely reflect the complexity of the underlying value chains. Therefore, it is worthwhile elaborating the value-chain effects of the EU's FTAs. We inserted the predictions of FTA-induced trade flows in the input–output representation of the global economy and extracted the total amount of value added in all production stages involving intermediate goods and services that were embodied in the bilateral effects. The results showed that the total increase in Finnish value added due to the post-2004 EU FTAs has been roughly 0.8 billion EUR annually, which is 1.6 per cent of all Finnish value-added exports. A rough estimate of the employment effect based on the industry-level employment output shares indicated that the corresponding production required approximately 10,000 employees in Finland. When we extrapolated our

findings on the effects of the new agreements on the previous FTAs, the numbers more than doubled, and the value-added was almost 1.7 billion EUR.

The division of the value added by the final producers revealed that the value added was mainly generated in products for which the final assembly was outside Finland, which illustrates the complexity of value chains. The Finnish value added that was generated in the production of Finnish final goods was only 19.7 per cent of the overall Finnish value added. In post-2004 FTAs, the largest individual final-assembly countries in addition to Finland were Korea, China and the United States. Our industry-level findings showed that the greatest gains in Finnish value added were related to the increased production of forest products. Another important field of production was shown to be the manufacture of various machinery and equipment. Although our gravity model was estimated using manufactured goods, it is also notable that a large fraction of the value added in their production was generated by trade, transportation and business services.

Regarding the EU level, we found that the total value-added effect was roughly 47 billion EUR (i.e., 2% of the EU's all value added in trade) in the EU's post-2004 FTAs and 137 EUR billions (3% of the EU's all value added in trade) in all EU FTAs.

Regarding individual countries, we found that, on average, the value added generated by the EU's post-2004 FTAs constituted 2.0 percent of the countries' total value-added exports, whereas the same share was 3.6 per cent in all FTAs. The ranking of countries in terms of the relative importance of the EU's FTAs showed that the new EU member states experienced the highest effects of the agreement through joining the EU. These countries benefitted from agreements because of their tight trade relations with partnering countries and/or the high share of industries that were particularly strongly influenced by the agreements. At the EU level, the value-added effect of FTAs was particularly strong in the mining and quarrying industries. Other important fields were the manufacture of motor vehicles, trailers, semi-trailers and other transport equipment as well as trade and business services.

We also assessed the effects of the EU's FTAs on the general equilibrium by incorporating the results of the gravity model in a macro model that captured the relevant links between the macro variables in an economy. In this task, we used the gravity model's estimates of Finnish gross export effects as inputs in the ETLA macro model.

According to the model simulations, the EU's free trade agreements raised the Finnish GDP modestly by around 0.1–0.4% in the medium term. The increase in GDP was due to higher exports and private consumption, which was also reflected in the gradual improvement in household real incomes and labour productivity, which

increased by 0.1–0.3%. The positive effect on employment in the medium term also slightly increased the GDP, but in the long run, the positive effects on the GDP were due to increases in labour productivity.

Overall, our findings suggest that the EU's FTAs have improved the trade balance of Finland and the EU. However, the effects have been relatively modest, reflecting the small sizes of the partner countries. In Finland, the benefits have been strongest in a limited number of sectors that have the highest comparative advantage.

9.3 Policy implications

Although this research was focused on the quantification of trade effects, it is worthwhile discussing the implications of our findings for policy. The limited positive effects of the agreements on trade, GDP and productivity raise the concern that Finland may have not fully reaped the potential benefits that the EU's FTAs provide. In comparison, Germany has reaped more benefits from the agreements, at least in terms of positive aggregate trade effects. Moreover, the increased Finnish trade with partner countries may require additional policy measures. For example, it may be costly for small- and medium-sized companies to become established in new export markets. To maximise the benefits of the EU's trade policies, the enforcement of the new EU FTAs should be well-coordinated with other export-promoting measures by the Finnish authorities.

Historically, most EU FTAs have been characterised by a relatively modest ambition in terms of market-opening. Notable exceptions are the EEA and the agreements with Turkey and Switzerland. The EU's recently negotiated trade agreements with Canada, Japan, Singapore and Vietnam are more ambitious and comprehensive than the older generation of EU's FTAs were. Thus, we may expect that these agreements will have larger effects on trade than the previous FTAs had.

One reason for the growing popularity of regional trade agreements since the 2000s has been the failure of the WTO to develop as a facilitator of world trade. Prompted by the fact the WTO member countries could not reach a comprehensive agreement on trade liberalisation that would include "behind the border" issues (e.g., regulatory issues, rules on foreign investment and investment protection, and government procurement), the formation of regional trade arrangements has increased. Recently, the change in the trade policy strategy of the United Stated and Brexit have increased incentives to agree on regional trade arrangements. The United States' turnaround from being a supporter and facilitator of global free trade to being a full-fledged critic of it has left the EU with an important role to play as a guarantor of the continuity of

the global free trade movement. In addition to the EU, Japan, Australia, Canada and many other countries have expressed the desire to pursue free trade and to develop multilateral trade agreements. However, it should be noted that the effects of trade agreements may be limited, especially if their scope remains superficial. Thus, it is important that the EU maintain a high level of ambition to achieve comprehensive and deep trade agreements with new partner countries. As previous studies have shown, the deeper the trade agreement, the greater its expected effects on trade.

Although bilateral trade agreements are compatible with open trade, they cannot fully replace the transparency and predictability created by the WTO and its dispute settlement mechanism in world trade relations. Therefore, we may conclude that in addition to negotiating new bilateral and multilateral trade agreements in greater depth, the EU should continue to support the reform of the WTO and its viability.

Appendix

A1 The Gravity Model

The gravity model is one of the main tools for evaluating effects of various policy-based or non-policy-based trade costs, such as free trade agreements, on bilateral trade flows. It has been is widely used in the empirical international trade literature (see e.g. Anderson & Yotov (2010), Anderson & Van Wincoop (2003), Helpman, Melitz &Rubinstein (2008), Egger & Larch (2011), Head & Mayer (2014), Brakman, Kohl & Van Marrewijk (2015),and Bekkers and Rojas-Romagosa (2018) among others). The model is very intuitive in the sense that its idea is analogous to the Newton's Law of Universal Gravitation, according to which any particle in the universe attracts any other particle thanks to a force that is directly proportional to the product of their masses and inversely proportional to the square of the distance between them. Applied to international trade, Law of Gravity implies that countries trade in proportion to their respective market size (e.g. gross domestic products) and proximity.

In addition to the intuitiveness of the gravity model, Larch and Yotov (2016) identify additional four features of the model that explain its popularity. First, the theoretical foundations of the gravity equation are now well-founded. This makes the model suitable for (counterfactual) policy analysis. It negates the Lucas Critique (Lucas, 1976) named after Robert Lucas's work on macroeconomic policymaking, which argues that it is naive to try to predict the effects of a change in economic policy entirely on the basis of relationships observed in historical data, especially highly aggregated historical data. Second, the model considers a general equilibrium setting. Third, the model is flexible in the sense that it can be extended to include other nonstandard features such as investments and the environment. Finally, the model has shown to have strong predictive power. In empirical estimates, it typically delivers a fit between 60 and 90 per cent with aggregate data.

A1.1 Model specification

We follow closely Yotov, Piermartini, Monteiro, and Larch (2016) in the exposition of the structural gravity system. The structural gravity model has a firm theoretical basis delivers a tractable framework for trade policy analysis in a multi-country environment.

We construct a world with N countries. Each of them produces a variety of goods that are differentiated by the country of origin (Armington, 1969). These products are then traded internationally. We omit the time dimension t from the equations to simplify them.

The value of domestic production (GDP) in country *i* is given by $Y_i = p_i Q_i$, where *Q* is the volume of output and *p* is its factory-gate price. Aggregate expenditure is denoted by E_i. If output and expenditure are equal, the country's trade account is balanced. If expenditure exceeds output, the country is running a trade deficit.

Consumers maximize a homothetic CES-utility function that is identical across all countries. In country *j* it is given by:

$$\left[\sum_i \alpha^{\frac{1-\sigma}{\sigma}} c_{ij}^{\frac{\sigma-1}{\sigma}}\right]^{\frac{\sigma-1}{\sigma}}, \tag{0.1}$$

where $\sigma > 1$ is the elasticity of substitution between the different varieties of products originating from different countries, $\alpha > 0$ is an exogenous preference, and c_{ij} denotes the consumption in country *j* of products produced in country *i*. Consumers' budget constraint is given by:

$$\sum_i p_{ij} c_{ij} = E_j \,. \tag{0.2}$$

Delivered prices, $p_{ij} = p_i t_{ij}$, are given by the factory-gate prices in the country of origin multiplied by bilateral trade costs $t_{ij} \geq 1$ between countries *i* and *j*. As usually, bilateral trade costs are defined as iceberg costs (Samuelson, 1952), meaning that a part of the shipment 'melts' en route to its destination.

Solving for the consumers' optimisation problem, we find exports X_{ij} from country i to country j to be:

$$X_{ij} = \left(\frac{\alpha_i p_i t_{ij}}{P_j} \right)^{1-\sigma} E_j , \tag{0.3}$$

where

$$P_j = \left[\sum_i \left(\alpha_i p_i t_{ij} \right)^{1-\sigma} \right]^{\frac{1}{1-\sigma}} \tag{0.4}$$

is a CES consumer price index.

Some conclusions arise from these equations. All else equal, larger and/or richer countries consume more of all varieties from all source countries. Imports from country i are affected negatively by higher factory gate prices and higher bilateral trade costs.

The relatively more expensive other countries' varieties are, the more consumers in country j will substitute away from them and toward the goods from country i. Furthermore, a higher elasticity of substitution will increase the trade diversion effects from more expensive commodities to cheaper ones.

Market clearance for goods from each origin is given by:

$$Y_i = \sum_j \left(\frac{\alpha_i p_i t_{ij}}{P_j} \right)^{1-\sigma} E_j . \tag{0.5}$$

Accordingly, the value of output at delivered prices in country i, Y_i, is equal to the total expenditure of this country's variety in all countries, including i itself. We next define $Y \equiv \sum_i Y_i$ and divide the market clearing condition by Y. After rearranging we get

$$\left(\alpha_i p_i \right)^{1-\sigma} = \frac{\frac{Y_i}{Y}}{\sum_j \left(\frac{t_{ij}}{P_j} \right)^{1-\sigma} \frac{E_j}{Y}} \tag{0.6}$$

The term in the denominator can be defined as $\Pi_i^{1-\sigma} \equiv \sum_j \left(t_{ij}/P_j\right)^{1-\sigma} E_j/Y$ (Anderson and van Wincoop, 2003). Consequently,

$$\left(\alpha_i p_i\right)^{1-\sigma} = \frac{Y_i/Y}{\Pi_i^{1-\sigma}}. \tag{0.7}$$

The structural gravity system is thus given by three equations:

$$X_{ij} = \frac{Y_i E_j}{Y}\left(\frac{t_{ij}}{\Pi_i P_j}\right)^{1-\sigma}, \tag{0.8}$$

$$\Pi_i^{1-\sigma} = \sum_j \left(\frac{t_{ij}}{P_j}\right)^{1-\sigma} \frac{E_j}{Y}, \tag{0.9}$$

$$P_j^{1-\sigma} = \sum_i \left(\frac{t_{ij}}{\Pi_i}\right)^{1-\sigma} \frac{Y_i}{Y}. \tag{0.10}$$

The first equation can be divided into two terms, a size term, $Y_i E_j/Y$, and a trade cost term, $\left[t_{ij}/\left(\Pi_i P_j\right)\right]^{1-\sigma}$. Accordingly, exports *X* from country *i* to country *j* depend positively on output *Y* in country *i*, expenditure *E* in county *j* (i.e. GDP in the two countries), and negatively on world GDP. Based on these equations, large producers will export more to all destinations, big/rich markets will import more from all source countries, and trade flows between countries *i* and *j* will be larger the more similar in size the countries are.

In the trade cost term, inward multilateral resistance (P_j), see Anderson and van Wincoop (2003), represents importer *j*'s ease of market access. Outward multilateral resistances, Π_i measures exporter *i*'s ease of market access. These are affected by, among other things, tariffs and non-tariff barriers between the countries. Multilateral resistances translate the initial, partial equilibrium effects of trade policy at the bilateral level to country-specific effects on consumer and producer prices. (Yotov, Piermartini, Monteiro, and Larch, 2016.) In our baseline model, we focus on the partial equilibrium effects as given by the equation (1.8). The equations (1.9) and (1.10) that allow the multilateral resistances to change are used later in the general equilibrium analysis.

A1.2 Estimation with gravity model

Traditionally, trade has been explained in gravity models by the distance between the countries and by a selection of other variables such as a common border, language or religion, or an earlier colonial relationship. In economics, the gravitational pull in trade (or investment) depends on country-specific and pair-specific variables, such as GDP and distance between two trading partners. Distance does not only capture the effect of transportation costs, but also historical and cultural ties, and other trade costs. Close ties tend to increase trade, while trade barriers increase trade costs and thereby reduce trade. The existence of trade and other agreements has also often been controlled.

More recently, two different sets of fixed effects (dummy variables) have been substituted for the above-mentioned traditional gravity variables. The first set of fixed effects, directional (exporter and importer) fixed effects, account for the multilateral resistance terms. It should be noted that in addition to accounting for the unobservable multilateral resistance terms, the exporter-time and importer-time fixed effects will also absorb the country size variables from the structural gravity model as well as all other observable and unobservable country-specific characteristics, which vary across these dimensions, including various national policies, institutions, and exchange rates.

The second set of fixed effects that are country-pair-specific provide a comprehensive account of the effects of all time-invariant bilateral factors, such as distance, a common language or colonial history that affect trade flows. These pair fixed effects have also been shown to carry systematic information about trade costs in addition to the information captured by the standard gravity variables (Egger and Nigai, 2015; Agnosteva et al., 2014). Another benefit with pair fixed effects is that they can account for the endogeneity of trade policy variables (Baier and Bergstrand, 2007).

We use the model with directional and pair fixed effects as the main estimation model. To this model we include dummy variables capturing the effect of the EU FTAs and controlling for the effects of EU membership and other RTAs. We use two different specifications; one which estimates the impact of the EU FTAs on total trade flows, and another which separates the effects of the EU FTAs for exports and imports. The latter estimation model is given by:

$$X_{ijt} = \exp\left[\pi_{it} + \chi_{jt} + \mu_{ij} + \beta_1 EU\ FTA_{ijt} + \beta_2 EU\ FTA_{jit} + \beta_3 EU_{ijt} + \beta_4 RTA_{ijt}\right] x\ e_{ijt} \quad (1.11)$$

and with globalisation dummies:

$$X_{ijt} = \exp\left[\pi_{it} + \chi_{jt} + \mu_{ij} + \beta_1 EU\ FTA_{ijt} + \beta_2 EU\ FTA_{jit} + \beta_3 EU_{ijt} + \beta_4 RTA_{ijt} + \sum_{t=1988}^{2016} \beta_t INTL_{ijt}\right] x\ e_{ijt}. \quad (1.12)$$

The variable Xijt denotes nominal trade flows year t. The term πi,t denotes the set of time-varying source-country dummies, which control for the outward multilateral resistances, countries' output shares and, potentially any other observable and unobservable exporter-specific factors that may influence bilateral trade. The term χj,t encompasses the set of time-varying destination-country dummy variables that account for the inward multilateral resistances, total expenditure, and any other observable and unobservable importer-specific characteristics that may influence trade. The term μij denotes the set of country-pair fixed effects. EU FTAijt is a dummy variable for EU's FTA agreements, capturing their effect on exports, EU FTAjit is an equivalent dummy for imports, EUijt 3 is a dummy variable for the EU membership accession and RTAijt is a dummy for other regional trade agreements. Tthe error term is given by εij,t.

When using intra-trade data, we can also construct dummies that capture the effects of globalisation, i.e. the change from national to intra-national trade. Otherwise, the estimated effects of trade agreements may be biased upward because they capture globalisation effects, such as technology and innovation (Bergstrand et al. 2015). The new covariate, $INTL_{ijt}$, is a dummy variable taking the value of one for international trade for each year t, and zero otherwise. The INTL dummy for 2015 (the most recent year in our data) is dropped to avoid perfect collinearity.

We estimate the model using PPML (Poisson Pseudo Maximum Likelihood) estimation method, and more specifically its ppml_panel_sg version in STATA. The use of PPML is encouraged by Santos Silva and Tenreyro (2006). This method allows us to use pair fixed effects in a multiplicative space as shown in equation 1.11. Importantly, PPML also allows for the existence trade flows that are equal to zero. In a linear, logarithmic OLS (ordinary least squares) estimation these would impose a problem, because these observations are simply dropped from the estimation sample when the value of trade is transformed into a logarithmic form. Thus, the estimation would not take into account the information contained in the zero trade flows. This is particularly important when we estimate the impact on different sectors, because in this case there are a lot of zero trade flows between countries.

PPML also accounts for heteroscedasticity, its additive property ensures that the gravity fixed effects are identical to their corresponding structural terms, and the estimator can also be used to calculate theory-consistent general equilibrium effects of trade policies. (Yotov, Piermartini, Monteiro, and Larch, 2016.)

As robustness check, we present estimation results of different gravity estimations, which all follow the recommendations put forth by Yotov, Piermartini, Monteiro, and Larch (2016), but differ in some respects. We report the results of our preferred estimation model in the main text and the results of the alternative estimation models in the Appendix A3.

It is natural to expect that the adjustment of trade flows in response to trade policy changes will take some time. To allow for an adjustment, researchers have used panel data with intervals instead of data pooled over consecutive years. For example, Trefler (2004) uses 3-year intervals, Anderson and Yotov (2016) use 4-year intervals, and Baier and Bergstrand (2007) use 5-year intervals. Olivero and Yotov (2012) provide empirical evidence that gravity estimates obtained with 3-year and 5-year interval trade data are very similar. On the other hand, using every year of the data gives maximal degrees of freedom for identifying direction-specific estimates for effects of FTAs (Baier et al. 2019). In the analysis of aggregate trade flows, we use yearly data. In the sector-level estimations, the data set is very large and due to computational limitations, we use 3-year intervals.

A1.3 General equilibrium gravity model

When studying the effects of trade agreements, it is justified to focus on the initial direct impacts, i.e. the partial equilibrium effects. The direct effects are the strongest and give a good estimation of how trade flows are affected (Yotov et al. 2016). However, when estimating the hypothetical effects of future agreements, a general equilibrium model is useful. In the general equilibrium model, the multilateral resistances, prices and production are all allowed to adjust as a result of the trade agreement. The changing trade costs give us an estimation of how trade flows would be impacted if a new trade agreement was enforced.

The general equilibrium model includes the equations (1.8)-(1.10) but also lets prices and production adjust. The gravity system is now given by (1.8)-(1.10) and

$$p_i = \left(\frac{Y_i}{Y}\right)^{\frac{1}{1-\sigma}} \frac{1}{\alpha_i \Pi_i} \tag{1.13}$$

$$E_i = \varphi_i Y_i = \varphi_i p_i Q_i, \tag{1.14}$$

where p_i is the factory-gate price for each variety of goods in the country of origin i; Q_i is the quantity (or endowment) supplied of each variety of goods in country i; and φ_i is an exogenous parameter defining the relation between the value of output and aggregate expenditure. When φ_i > 1, country i faces a trade deficit, whereas it runs a trade surplus when 1 > φ_i > 0.

When constructing the general equilibrium model, the first step is to estimate the partial equilibrium effects, i.e. the direct impact of e.g. trade agreements. This is done in the same way as explained A1.2. Then, the next step is constructing conditional general equilibrium effects. This means that the multilateral resistances change for all countries in the sample as a result of the trade agreements, i.e. the effects of the FTAs ripple through to the rest of the world. Now, when the trade costs t_{ij} for each country pair change as a result of the direct FTA effects, the multilateral resistances in equations (1.9) and (1.10) also change. However, the output (Y_i) and expenditure (E_i) are not affected at this stage. The "conditional" in the name of this step comes from this fact.

The conditional general equilibrium model is important for our analysis, as we use the changes in trade costs due to hypothetical FTAs to predict their impacts. For this purpose, we first estimate the partial impact of existing EU FTAs and the complementary multilateral resistances. Then, we impose a hypothetical new FTA and find the effect on trade costs via both the direct impact and changing multilateral resistances.

Finally, the last step is to construct the full endowment general equilibrium effects. Now, the equation (1.13) allows the factory-gate prices p_i to change when the multilateral resistances change. Then, as a result of the price change, the output and expenditure also change in the equation (1.14). The endowment Q_i remains unchanged in this model. The full endowment general equilibrium gives us the final estimations of full effects of the new FTAs.

A2 Countries included in the analysis

Table A2.1 lists the countries in the analysis concerning goods trade and services trade in this study. It also shows which countries are EU members and which other countries the EU has an FTA agreement with along with the year the agreement entered into force.

Table A2.1 List of countries included in the analysis for goods trade and services trade together with their status as an EU country or FTA partner

	Goods: Aggregate level	Goods: Sector level	Services	EU country	FTA in force
Albania	x	x	x		2009
Algeria	x	x	x		2005
Angola			x		
Andorra		x			1991
Antigua and Barbuda		x			2008
Armenia	x				
Argentina		x	x		
Australia	x	x	x		
Austria	x	x	x	EU	
Azerbaijan	x	x			
Bahamas		x			2008
Bahrain, Kingdom of	x	x	x		
Bangladesh		x	x		
Barbados	x	x			2008
Belarus		x			
Belgium	x	x	x	EU	
Belize		x			2008
Bolivia, Plurinational State of	x	x			
Bosnia and Herzegovina		x	x		2015
Botswana	x	x	x		2016
Brazil	x	x	x		
Bulgaria	x	x	x	EU	
Cambodia		x			
Cameroon		x	x		2014
Canada	x	x	x		2017
Chile	x	x	x		2005
China	x	x	x		
Colombia	x	x	x		2013
Costa Rica	x	x	x		2013
Côte d'Ivoire		x	x		2016
Croatia	x	x	x	EU	
Cyprus	x	x	x	EU	
Czech Republic	x	x	x	EU	
Denmark	x	x	x	EU	
Dominica		x			2008
Dominican Republic		x	x		2008
Ecuador	x	x	x		
Egypt	x	x	x		2004
El Salvador		x	x		2013

Estonia	x	x	x	EU	
Eswatini		x	x		2016
Ethiopia	x	x			
Faeroe Islands		x			1997
Fiji	x	x	x		2011
Finland	x	x	x	EU	
France	x	x	x	EU	
Gabon			x		
Georgia	x	x	x		2014
Germany	x	x	x	EU	
Ghana		x	x		2016
Greece	x	x	x	EU	
Grenada		x	x		2008
Guatemala		x	x		2013
Guyana		x	x		2008
Honduras		x	x		2013
Hong Kong, China	x	x			
Hungary	x	x	x	EU	
Iceland	x	x	x		1994
India	x	x	x		
Indonesia	x	x	x		
Iran, Islamic Republic of			x		
Ireland	x	x	x	EU	
Israel	x	x	x		2000
Italy	x	x	x	EU	
Jamaica		x	x		2008
Japan	x	x	x		2019
Jordan	x	x	x		2002
Kazakhstan	x	x	x		
Kenya	x				
Kyrgyzstan	x				
Korea, Republic of	x	x	x		2011
Kuwait, the State of	x	x			
Latvia	x	x	x	EU	
Lebanon		x	x		2006
Lesotho		x	x		2016
Lithuania	x	x	x	EU	
Luxembourg	x	x	x	EU	
Macao, China	x	x			
Madagascar		x	x		2012
Malawi	x				
Malaysia	x	x	x		
Malta	x	x	x	EU	
Mauritius	x	x			2012
Mexico	x	x	x		2000
Moldova, Republic of	x	x	x		2014
Mongolia	x				
Montenegro		x	x		2010
Morocco	x	x	x		2000
Mozambique		x	x		2018
Namibia		x	x		2016
Nepal		x			
Netherlands	x	x	x	EU	
New Zealand	x	x	x		
Nicaragua		x	x		2013

Nigeria		x	x		
North Macedonia	x	x	x		2004
Norway	x	x	x		1994
Occupied Palestinian Territory		x	x		1997
Oman	x	x			
Pakistan		x	x		
Panama		x			2013
Papua New Guinea		x	x		2011
Paraguay		x			
Peru	x	x	x		2013
Philippines	x	x	x		
Poland	x	x	x	EU	
Portugal	x	x	x	EU	
Qatar	x	x			
Romania	x	x	x	EU	
Russian Federation	x	x	x		
Saint Kitts and Nevis		x			2008
Saint Lucia		x	x		2008
Saint Vincent and the Grenadines		x	x		2008
Saudi Arabia, Kingdom of		x	x		
Senegal	x	x	x		
Serbia		x	x		2013
Seychelles		x	x		2012
Singapore	x	x	x		2019
Slovak Republic	x	x	x	EU	
Slovenia	x	x	x	EU	
South Africa	x	x	x		2000
Spain	x	x	x	EU	
Sri Lanka	x	x			
Suriname	x	x	x		2008
Sweden	x	x	x	EU	
Switzerland	x	x	x		1988
Tanzania	x	x			
Thailand	x	x	x		
Trinidad and Tobago	x	x			2008
Tunisia	x	x	x		1998
Turkey	x	x	x		1996
Ukraine	x	x	x		2016
United Arab Emirates	x	x			
United Kingdom	x	x	x	EU	
United States	x	x	x		
Uruguay	x	x			
Venezuela, Bolivarian Republic of		x	x		
Viet Nam	x	x	x		*
Zimbabwe		x	x		2012
Number of countries in total	92	131	107	28	66

* Awaiting signature and conclusion as of autumn of 2019.

A3 Sector-specific analysis

In addition to analysing the aggregate effects of trade agreements, we analyse the impact of the EU FTAs on primary production and manufacturing sectors. We use the specification given by equation 1.11 for the estimating sectoral effects of the EU FTA with an adjustment of the fixed effects. When estimating sectoral data, the origin-time fixed effects become origin-industry-time effects, the destination-time fixed effects become destination-industry-time effects, and pair-specific terms become origin-destination-industry-specific terms. (see Larch 2017 and Zylkin.)

The sector-level analysis is done at the two-digit industry level of ISIC Rev. 4 (also NACE Rev. 2) with some aggregation. This industry classification corresponds to one used in the World Input-Output Database (WIOD). We choose the same classification as in WIOD because the estimates from the gravity estimations are used in the analysis of the effects of valued-added chains using WIOD .First, we aggregate the HS6 level product data to the sectoral data by using a correspondance table between the different classifications.[27] The 24 industries are aggregated as follows:

A01	Crop and animal production, hunting and related service activities
A02	Forestry and logging
A03	Fishing and aquaculture
B	Mining and quarrying
C10-C12	Manufacture of food products, beverages and tobacco products
C13-C15	Manufacture of textiles, wearing apparel and leather products
C16	Manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials
C17	Manufacture of paper and paper products
C18	Printing and reproduction of recorded media
C19	Manufacture of coke and refined petroleum products
C20	Manufacture of chemicals and chemical products
C21	Manufacture of basic pharmaceutical products and pharmaceutical preparations
C22	Manufacture of rubber and plastic products
C23	Manufacture of other non-metallic mineral products
C24	Manufacture of basic metals
C25	Manufacture of fabricated metal products, except machinery and equipment
C26	Manufacture of computer, electronic and optical products
C27	Manufacture of electrical equipment
C28	Manufacture of machinery and equipment n.e.c.
C29	Manufacture of motor vehicles, trailers and semi-trailers
C30	Manufacture of other transport equipment
C31_C32	Manufacture of furniture; other manufacturing
C33	Repair and installation of machinery and equipment
D35	Electricity, gas, steam and air conditioning supply

[27] Some product are left out of the analysis, for example recording media whether they are recorded or not. These products could be placed in either manufacturing or services, but there is no way of knowing which one. They have thus been omitted from the analysis.

In addition to the above industries, the WIOD database includes the following sectors. All these sectors are used in the analysis concerning the value added impact of the trade agreements.

E36	Water collection, treatment and supply
E37-E39	Sewerage; waste collection, treatment and disposal activities; materials recovery; remediation activities and other waste management services
F	Construction
G45	Wholesale and retail trade and repair of motor vehicles and motorcycles
G46	Wholesale trade, except of motor vehicles and motorcycles
G47	Retail trade, except of motor vehicles and motorcycles
H49	Land transport and transport via pipelines
H50	Water transport
H51	Air transport
H52	Warehousing and support activities for transportation
H53	Postal and courier activities
I	Accommodation and food service activities
J58	Publishing activities
J59_J60	Motion picture, video and television programme production, sound recording and music publishing activities; programming and broadcasting activities
J61	Telecommunications
J62_J63	Computer programming, consultancy and related activities; information service activities
K64	Financial service activities, except insurance and pension funding
K65	Insurance, reinsurance and pension funding, except compulsory social security
K66	Activities auxiliary to financial services and insurance activities
L68	Real estate activities
M69_M70	Legal and accounting activities; activities of head offices; management consultancy activities
M71	Architectural and engineering activities; technical testing and analysis
M72	Scientific research and development
M73	Advertising and market research
M74_M75	Other professional, scientific and technical activities; veterinary activities
N	Administrative and support service activities
O84	Public administration and defence; compulsory social security
P85	Education
Q	Human health and social work activities
R_S	Other service activities
T	Activities of households as employers; undifferentiated goods- and services-producing activities of households for own use
U	Activities of extraterritorial organizations and bodies

A4 Robustness

A4.1 Estimations of total effects with traditional gravity model

As explained in Appendix A1, the gravity model has traditionally included time-invariant bilateral factors, such as distance, common language or colonial history. Using pair fixed effects instead of these traditional gravity variables has become a standard practice with gravity estimations. We use the model with traditional variables to check for robustness of our results. For this purpose, the estimated model is given by:

$$X_{ijt} = \exp\left[\pi_{it} + \chi_{jt} + \beta_1 EU\ FTA_{ijt} + \beta_2 EU\ FTA_{jit} + \beta_3 EU_{ijt} + \beta_4 RTA_{ijt} + \sum_{i=5}^{8} \beta_i \Lambda_i\right] x\ e_{ijt} \quad (1.15)$$

where πit is exporter-time fixed effects and χit is importer-time fixed effects and all the other terms are defined as in equation 1.15. The pair fixed effects are now replaced by gravity variables, $\Lambda = \left\{\ln D_{ij}, CONTIG_{ij}, LANG_{ij}, COL_{ij}\right\}$, where distance is given by D, a common border by CONTIG, a common language by LANG, and some earlier colonial relationship by COL.

Table A4.1 Total effect of trade agreements on EU, 1988-2017

VARIABLES	(1)	(2)	(3)
Shared border	0.391***	0.418***	0.379***
	(0.0992)	(0.0990)	(0.0949)
Common language	0.296***	0.279***	0.234***
	(0.0916)	(0.0850)	(0.0840)
Ever in a colonial relationship	0.0680	0.0386	0.0925
	(0.126)	(0.117)	(0.110)
Logarithm of distance	-0.697***	-0.679***	-0.663***
	(0.0290)	(0.0289)	(0.0285)
EU FTA – EU total	-0.0132	0.127	0.198**
	(0.0924)	(0.0979)	(0.0918)
EU		0.741***	0.717***
		(0.100)	(0.102)
Other RTAs			0.447***
			(0.110)
Observations	377,283	377,283	377,283
R-squared	0.867	0.878	0.877

Robust standard errors are in parentheses. The errors are clustered by distance. All specifications include importer-time and exporter-time fixed effects.. *** p<0.01, ** p<0.05, * p<0.1

It may be noted that the traditional gravity variables are symmetric for both directions. For example, the Sweden-Finland pair has the same variable values as Finland-Sweden in our data. However, when we want to study the effects of trade agreements on imports and exports separately, the trade agreement impacts should be allowed to be different depending on the direction (Baier, Yotov & Zylkin 2019). As such, using symmetric bilateral variables is not as likely to provide accurate results in this case. Therefore, we only estimate the impact of trade agreements on total trade and do not separate imports and exports in this robustness check.

Table A4.1 shows our estimations in the EU level. The coefficients of Shared border, Common Language and Distance are statistically significant and have expected signs. As can be seen, the estimated coefficient for the EU FTAs is not very large with either method. With gravity variables it becomes statistically significant when we include controls for both EU accession and other RTAs.

In Table A4.2 we show the results for Finland our estimations in the EU level. The estimated coefficients for the EU FTAs on Finland are negative but not statistically significant in both types of specifications. These results show similarities to the estimations that include pair fixed effects, although the statistical significance is now lower.

Table A4.2 The effects of EU FTAs on Finnish trade, 1995-2017

VARIABLES	(1)	(2)	(3)
Shared border	0.381***	0.398***	0.401***
	(0.0977)	(0.0965)	(0.0965)
Common language	0.289***	0.292***	0.286***
	(0.0925)	(0.0911)	(0.0914)
Ever in a colonial relationship	0.0845	0.0577	0.0633
	(0.128)	(0.119)	(0.118)
Logarithm of distance	-0.699***	-0.686***	-0.687***
	(0.0289)	(0.0291)	(0.0289)
EU FTA -Finland	-0.241	-0.288	-0.294
	(0.198)	(0.202)	(0.207)
EU FTA - Rest of the EU	-0.172*	-0.0899	-0.160
	(0.0911)	(0.0955)	(0.110)
EU		0.714***	0.688***
		(0.105)	(0.110)
Other RTAs			0.123
			(0.0856)
Observations	320,555	320,555	320,555
R-squared	0.865	0.871	0.870

Robust standard errors are in parentheses. The errors are clustered by distance. All specifications include importer-time and exporter-time fixed effects. *** p<0.01, ** p<0.05, * p<0.1

A4.2 Estimations of total effects excluding globalisation effects

Our main results for aggregate manufacturing trade include intra-trade data and controls for globalisation, as both of these are arguably important for trade development in the recent decades. However, in some cases the globalisation dummies can bias the estimates for FTA impacts downwards. Therefore, we also present the results without the globalisation dummies for comparison. Without globalisation controls, the estimated coefficients are large for the EU level, which suggests that they now also capture the globalisation effect.

Table A4.3 The effects of EU FTAs on the EU trade with intra-trade, 1995-2017

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)
EU FTA - EU total	0.430***	0.469***	0.500***			
	(0.0840)	(0.0834)	(0.0803)			
EU FTA –EU as importer				0.326***	0.363***	0.403***
				(0.0991)	(0.0996)	(0.0985)
EU FTA –EU as exporter				0.535***	0.576***	0.597***
				(0.116)	(0.116)	(0.112)
EU		0.719***	0.841***		0.719***	0.841***
		(0.0653)	(0.0778)		(0.0652)	(0.0777)
Other RTAs			0.354***			0.353***
			(0.0770)			(0.0769)
Observations	211,374	211,374	211,374	211,374	211,374	211,374
R-squared	0.999	0.999	0.999	0.999	0.999	0.999

Robust standard errors, clustered by pair-id, are in parentheses. All specifications include importer-time, exporter-time and pair-fixed effects. p<0.01, ** p<0.05, * p<0.1

It is difficult to isolate this effect for different countries, as the speed of globalisation can vary greatly. For Finland, the estimated coefficients for exports to FTA partner countries are positive and significant without globalisation dummies. For imports, the effect is negative but it is not statistically significant. It is possible that the globalisation dummies bias our main results for Finland downwards too much. The estimates in Table A4.5 suggest that EU FTAs have increased Finnish exports by about 25 per cent.

Table A4.5 The effects of EU FTAs on Finnish trade with intra-trade, 1995-2017

VARIABLES	(1)	(2)	(3)
EU FTA - Finland as importer	-0.110	-0.107	-0.0872
	(0.110)	(0.111)	(0.112)
EU FTA - Finland as exporter	0.202**	0.214**	0.223***
	(0.0878)	(0.0878)	(0.0858)
EU FTA - Rest of the EU as importer	0.215***	0.248***	0.265***
	(0.0833)	(0.0831)	(0.0824)
EU FTA - Rest of the EU as exporter	0.427***	0.464***	0.472***
	(0.0981)	(0.0963)	(0.0944)
EU		0.767***	0.777***
		(0.0600)	(0.0604)
Other RTAs			0.171***
			(0.0561)
Observations	177,220	177,220	177,220
R-squared	1.000	1.000	1.000

Robust standard errors, clustered by pair-id, are in parentheses. All specifications include importer-time, exporter-time and pair-fixed effects. *** p<0.01, ** p<0.05, * p<0.1

A5 The gravity model of FDI

The most notable difference to our previous specification concerning the trade effects is that we now use a gravity model specification with gravity variables rather than our previous pair fixed effects specification. The reason is that there are many zero values and missing observations in our FDI data, and thus pair fixed effects have a risk to be collinear with the variables of capturing the effect of FTAs. This would make the results possibly unreliable. Some previous studies use pair fixed effects (e.g. Bergstrand & Egger 2007, Berger, Busse, Nunnenkamp & Roy, 2013), but this approach is still less common.

In our analysis, we include traditional gravity variables such as the size of the markets (GDP), distance, and common language to control for time-invariant country-pair specific factors affecting FDI. Moreover, we control several other factors that impact FDI flows between countries but are not typically included in a gravity model of trade. For instance, factors such as the host country's trade openness and political freedom may explain its attractiveness for foreign investment.

Formally, we study the years 2000-2017 and estimate the following equation:

$$FDI_{ijt} = \exp[\lambda_t + \mu_i + \varphi_j + \beta_1 \ln(GDP_{it}) + \beta_2 \ln(GDP_{jt}) + \beta_3 \ln(D_{ij}) + \beta_4 smctry_{ij} + \beta_5 lang_{ij} + \beta_6 col_{ij} + \beta_9 BIT_{ijt} + \beta_{10} EU_{ijt} + \beta_{11} RTA_{ijt} + \beta_{12} RTA_{jit} + \gamma' CONTROL_{jt}] x\, e_{ijt}. \quad (1.16)$$

Let us describe the variables in our estimation equation in detail. FDI_{ijt} is the (current dollar) value of FDI flows between source country i and host country j at a time t. On the right-hand side, the explanatory variables include natural logarithms of GDP levels of source and host countries. Their coefficients β_1 and β_2 are expected to be positive, since higher GDP of both the source and the host country is expected to increase bilateral FDI flows (Chenaf-Nicet & Rougier 2015). We also include the gravity variables that affect the transaction costs between countries, namely the natural logarithm of distance between the capitals of the two countries and dummies for a shared border (smctry), common language (lang) and colonial history (col). These three variables take values 0 or 1 (1 if there exists a connection, e.g. there is a common language). Distance usually reduces the amount of FDI flowing between countries, and therefore the sign the coefficient β_3 is expected to be negative. On the other hand, if two countries share a border, language and/or colonial history, the amount of FDI flows is expected to be higher.

We use a dummy variable for bilateral investment treaties, BIT, that equals 1 if the pair of countries has a BIT in force in year t, and 0 if there is not treaty. A BIT is "an agreement between two countries regarding promotion and protection of investments made by investors from respective countries in each other's territory" (UNCTAD 2019).[28] BITs aim to reduce risks and enforce rules for foreign investment (Tobin & Rose-Ackerman 2005). In August 2019, there were 2353 BITs in force (UNCTAD 2019). Previous studies on the effects of BITs on FDI have shown that BITs generally increase FDI flows (see e.g. Egger & Merlo 2007, Busse, Königer & Nunnenkamp, 2010), so we expect the coefficient β_9 to be positive.

We use the same dummy variable for the EU FTAs as in the previous analysis on merchandise and service trade. As before, it is an index with values between 0 and 1 based on the depth of the trade agreement. We separate the effects of trade agreements when EU is the source vs. host of FDI ($EU\ FTA_{ijt}$ vs. $EU\ FTA_{jit}$). In addition, we also control for the effects of EU membership with a dummy that takes values 0 and 1. The EU dummy, as well as RTA and BIT, only include changes that have happened after the start of our observation period, i.e. 2000. For example, the

[28] https://investmentpolicy.unctad.org/international-investment-agreements

EU dummy only equals 1 if at least one party of the country pair joined the EU in 2004 or after, such as in the case of Finland-Hungary.

We include time and source and host country fixed effects (λ_t, μ_i and φ_j) as is standard in the literature (Chenaf-Nichet & Rougier 2016). The fixed effects control for the multilateral resistance terms. They are separate for time, host and source instead of host-time and source-time like in our previous analysis. Otherwise, the fixed effects would be collinear with many of the variables we include in FDI analysis, such as the GDPs of source and host countries.

As a robustness check, we also include four possible control variables that can explain the selection of hosts for FDI (CONTROL) in the main specification. First, openness to trade (defined as the sum of imports and exports as a share of GDP) is expected to be positively related to FDI flows. Following Berger et al. (2017), we also include GDP growth of the host country, as it is supposed to induce horizontal FDI by making the host country more attractive for multinational enterprises (Berger et al. 2013).[29] Finally, we also use a dummy that shows how free the host country is (in terms of political rights and civil liberties). The lowest value of the index is 1 (most free) and highest 7 (least free), and as such we expect the dummy to have a negative sign if more freedom is related to more FDI. The error term is given by $\varepsilon_{ij,t}$.

As in the previous analysis with the gravity model, we estimate the model using PPML (Poisson Pseudo Maximum Likelihood) estimation method, and more specifically its ppml_panel_sg version in STATA (with no pair fixed effects). The possibility of including trade flows that are equal to zero is especially important now that we have many country pairs with no FDI flows.

A6 Global value chains

We next formally represent the exclusion method. Similar to Los, Timmer, and de Vries (2016) and Ali-Yrkkö and Kuusi (2017), we partition the global input–output table such that we have a country s that signs a free trade agreement with a subsample or all of countries in the region r containing all other countries c in the world. After noting that we refer to input-output tables in a certain year *t*, while abstract from the further use of time indices, we construct a matrix **A** as follows:

[29] Horizontal FDI is an investment of multi-plant firms that duplicate similar activities in multiple countries to get access to local markets.

$$\boldsymbol{A} = \begin{bmatrix} \boldsymbol{A_{ss}} & \boldsymbol{A_{sr}} \\ \boldsymbol{A_{rs}} & \boldsymbol{A_{rr}} \end{bmatrix}$$

A contains the input coefficients a_{ij}, which give the value units of intermediate goods from industry *i* required to produce one value unit of gross output in industry *j.* $\boldsymbol{A_{ss}}$ represents the domestically purchased requirements of industries in country s, while $\boldsymbol{A_{sr}}$ gives the requirements by industries in *r* of products bought from industries in *s.* For the final demand block, we can similarly write as follows:

$$\boldsymbol{y} = \begin{bmatrix} \boldsymbol{y_{ss}} & \boldsymbol{y_{sr}} \\ \boldsymbol{y_{rs}} & \boldsymbol{y_{rr}} \end{bmatrix}$$

in which the vectors $\boldsymbol{y_{ss}}$ and $\boldsymbol{y_{sr}}$ represent the values of flows from industries in country *s* to all domestic final users and to final users in *r.*

For any country *c,* ratios of value added to gross output in industries in country *c* are contained in a row vector $\boldsymbol{v_c}$**.** The length of this vector equals the numbers of industries in *s* and *r* (with *r* containing multiple countries), with value-added ratios for industries in *c* as elements ($\overline{\boldsymbol{v}}_{\boldsymbol{c}}$) and zeros elsewhere: $\boldsymbol{v_c}$**=**$[\boldsymbol{0}\ \overline{\boldsymbol{v}}_{\boldsymbol{c}}\ \boldsymbol{0}]$. The actual value added in country *c* $(\boldsymbol{GDP_c})$ then equals

$$\boldsymbol{GDP_c} = \boldsymbol{v_c}(\boldsymbol{I} - \boldsymbol{A})^{-\boldsymbol{1}}\boldsymbol{Y} * \boldsymbol{i}$$

in which **i** is a column vector where all elements are unity, implying that it sums the two elements in each of the rows of the matrix **Y**. The element $(\boldsymbol{I} - \boldsymbol{A})^{-\boldsymbol{1}}$ is the well-known Leontief inverse, in which **I** is the identity matrix of appropriate dimensions. The expression is the key to accounting for the complexity of the trade patterns. In particular, $\boldsymbol{GDP_c}$ can be interpreted as the limiting value of the infinitely long sum of value-added contributions, with the number of stages varying from 1 to ∞.

Our estimation of the value-added impact builds on the sector-level gravity model. The gravity model allows us to build a counterfactual that measures trade flows in absence of the trade agreement. Let us denote the counterfactual of trade from country-industry i to country-industry j with the symbol *. Then, the corresponding final trade is denoted by y_{ij}^{*} and the intermediate use by A_{ij}^{*}.

In this report, we combine information from several estimations of the impact of FTAs. In case of Finland as a direct trading partner, we measure the impacts by using the FTA elasticities estimated for Finland. In case of trade with other EU countries, we use the estimated average trade elasticities.

It is notable that our trade model does not allow us to distinguish the effects of FTAs on intermediate and final goods separately. Therefore, the per centual effect on both flows is the same, and given by the overall impact in the sector specific model. For example, if the trade model forecasts an x per cent increase in the volume of this particular bilateral trade, we adjust the amount of final demand to be $y_{ij}^{*} = \frac{y_{ij}}{1+x}$ and $A_{ij}^{*} = \frac{A_{ij}}{1+x}$.

After constructing all the bilateral counterfactual trade flows, we create hypothetical global value chains without the impact of FTAs by collecting the bilateral flows into our expression of the aggregate value added. We define the matrices $\boldsymbol{A}^{*}$and $\boldsymbol{Y}^{*}$ as

$$\boldsymbol{A}^{*} = \begin{bmatrix} \boldsymbol{A_{ss}} & \boldsymbol{A_{sr}^{*}} \\ \boldsymbol{A_{rs}^{*}} & \boldsymbol{A_{rr}} \end{bmatrix}$$

and

$$\boldsymbol{Y}^{*} = \begin{bmatrix} \boldsymbol{y_{ss}} & \boldsymbol{y_{sr}^{*}} \\ \boldsymbol{y_{rs}^{*}} & \boldsymbol{y_{rr}} \end{bmatrix}$$

where we have replaced bilateral trade flows from r to s, and vice versa, with the counterfactuals. More generally, s could be a group of countries in case that there are trade agreements with multiple countries.

The hypothetical GDP in *c* can be obtained by post-multiplying the hypothetical Leontief inverse with the hypothetical final demand as

$$\boldsymbol{GDP_r^{*} = v_r(I - A^{*})^{-1}Y^{*} * i}$$

Following the logic of hypothetical extraction, the domestic value added in exports of r that result from the free trade agreement with country *s* can be derived as the difference between the GDP in the actual and hypothetical situations:

$$\boldsymbol{\Delta VA_r = GDP_r - GDP_r^{*}}$$

$\boldsymbol{\Delta VA_r}$ correctly measures the indirect and direct effects on the value chains and trade routes that follow from the exclusion of the direct trade linkage for region *r*.

A7 Macroeconomic analysis

Following reports all the model equations with t-values for the estimated coefficients, and adjusted coefficients of determination (R2) for each behavioral relation. In addition, it reports the ADF test statistics for the residual series of the long-run relations gained from the error correction models. For these, the critical 5 per cent value is 2,89. Symbol D in equations denotes to difference; - and + refer to lags and leads, respectively. T = n is a dummy variable which gets a value of 1 in the period n. All the variable names are explained in the variable list that can be found below.

Production and factor demands

Private capital stock

KP = IPQ + (1 - DEPR) * KP(-1)

Production function

LOG(VAQP_S) = - 0.438 + .65 * log(LHP) + .35 * log(KP) + RD * T

Private sector labor demand

DLOG(LHP) = 0.656 * DLOG(VAQP) - 0.440 * DLOG(WRP * (1 + (0.01 * EMPTAX)) / PQP) - 10.1 * D(RD) - 0.647 * (LOG(LHP(-1)) - 0.601 * LOG(VAQP(-1)) + 0.505 * LOG(WRP(-1) * (1 + (0.01*EMPTAX(-1))) / PQP(-1)) + 0.000851*T(-1) - 5.43 + 9.06*RD(-1))

R2 = 0.643 t1 = 7.52 t2 = -2.33 t3 = -6.27 t4 = -7.164785 ADF = -5.71

Industrial sector labor demand

LOG(LHI) = 6.19 + 0.278 * LOG(VAQI) - 0.251 * LOG(WRI * (1 + (0.01 * EMPTAX)) / PQI) - 0.00153 * T + 18.9 * RD

R2 = 0.939 t1 = 19.9 t2 = 3.72 t3 = -2.29 t4 = -2.36 t5 = 2.64

Private investments

DLOG(IPQ) = -9.14 * D(RD) + 0.887 * DLOG(VAQP) - 0.0163 * DLOG(UCC) - 0.0129 * (LOG(IPQ(-1)) + 0.5*LOG(UCC(-1)) - LOG(VAQP) + 0.0118 * T2(-1) + 2.24 + 46.0* RD(-1)-37.2 * RD(-5))

R2 = 0.237 t1 = -2.04 t2 = 4.99 t3 = -1.61 t4 = -0.866 ADF = -2.74

User cost of capital

UCC = ((PI / PQP) * (R10 * 0.01 - log(CPI / CPI(-4)) + DEPR))

Private value added

VAQP = GDPQ - VAQG - DEP

Nominal private value added

VAP = VAQP * PQP

Industrial sector value added

LOG(VAQI) = 1.31 * LOG(VAQP) - 3.94 + 0.296 * LOG(XV/GDPV) - 0.341 * LOG(WRP/PWI22)

R2 = 0.978 t1 = 18.7 t2 = -5.76 t3 = 8.06 t4 = -3.09

Value added in service (and construction) sector

VAQSE = VAQP - VAQI

Total value added

VAQ = VAQP + VAQG

Gross domestic product (in real terms)

GDPQ = IPQ + IGQ + CQ + GQ + XQ - MQ + INVQ

Potential output

QPOT = exp(-0.438 + .65 * log(LHP + ((UN - NAWRU) * LHS / 100)) + .35 * LOG(KP) + RD * T)

Output gap

QGAP = 100 * (VAQP - QPOT) / QPOT

Public value added

LOG(VAQG) = 8.15 + 0.107 * LOG(LHG)

R2 = 0.154 t1 = 18.0 t2 = 1.89

Nominal public value added

VAG = PQG * VAQG

Nominal value added

VA = VAP + VAG

Gross domestic product determined from supply side (in real terms)

GDPQ_S = VAQP_S + VAQG + DEP

Residual series for GDP from supply side

LOG(DEP) = 1.039 * log(VAQ(-4)) - 2.34 + RESID_DEP

Labor hours in service (and construction) sector

LHSE = LHP - LHI

Total labor hours

LH = LHG + LHP

Total employment (in persons)

LOG(LN) = -1.34 + 0.986 * LOG(LH) + 0.000401 * T + 0.0147 * (T=38) - 0.0239 * (T=9) + RESID_LN

Labor supply

LOG(LS) = -0.276 + 0.0207 * LOG(WRP * (1 - ((TAX_APW + TEKSOVA + ALV) / 100))) + 0.746 * LOG(POPEMP1564) + (1 - 0.746) * LOG(LN(-2))

R2 = 0.960 t1 = -17.3 t2 = 7.36 t3 = 50.5

Unemployment rate

UN = 100 * (LS - LN) / LS

Private sector productivity

PROD = VAQP / LHP

Total productivity

PRODQ = VAQ / LH

Consumption and foreign trade

Private consumption

DLOG(CQ) = 0.00214 - 0.0137 * D(D93) + 0.512 * DLOG(YHQ/PC) + 0.0540 * DLOG(W) - 0.203 * (LOG(CQ(-1)) - 0.475 - 0.9 * LOG(@MOVAV((YHQ(3))/PC(3),8)) - (1 - 0.9) * LOG(W(-1)) - 0.0300 * D95(-1))

R2 = 0.270 t1 = 1.47 t2 = -4.42 t3 = 4.34 t4 = 2.43 t5 = -2.38 ADF = -3.89

Private consumption (2) with forward-looking agents

DLOG(CQ) = 0.00270 - 0.0133 * D(D93) + 0.0308 * DLOG(W) + 0.514 * DLOG(YHQ/PC) - 0.00197 * (LOG(CQ(-1)) - 2.55 -0.5 * LOG(W(-1)) - 0.5 * LOG(YHQ(-1)/PC(-1)) + 12.2 * RD(-2))

R2 = 0.201 t1 = 1.99 t2 = -4.04 t3 = 1.15 t4 = 4.19 t5 = -0.160 ADF = -1.71

Private wealth

LOG(W) = 4.33 - 0.0264 * @MOVAV(R10(20) - (((PC(20)/PC(16) - 1) * 100)),20) + 0.0142 * @TREND

R2 = 0.807 t1 = 20.5 t2 = -0.844 t3 = 5.16

Nominal private consumption

CV = PC * CQ

Public consumption

GQ = GQP + (WSG / PG)

Nominal public consumption

GV = PG * GQ

Exports

DLOG(XQ) = 2.03 * DLOG(X22) + 11.7*D(RD) - 1.065 * DLOG(PX/PWI22) - 0.326 * (LOG(XQ(-1)) - 1.60 * LOG(X22(-1)) + 0.633 * LOG(PX(-1)/PWI22(-1)) - 31.1 * RD(-1)+0.661)

R2 = 0.491 t1 = 4.25 t2 = 3.42 t3 = -3.93 t4 = -3.62 ADF = -3.26

Nominal exports

XV = PX * XQ

Imports

DLOG(MQ) = 0.00338 + 0.361 * DLOG(XQ) + 0.429 * DLOG(CQ + IPQ + GQ) - 0.181 * (LOG(MQ(-1)) + 0.341 - 0.685 * LOG(XQ(-1)) - (1 - 0.685) * LOG(CQ(-1) + IPQ(-1) + GQ(-1)) + 0.679 * LOG(PM(-1) / PC(-1)))

R2 = 0.407 t1 = 1.16 t2 = 4.78 t3 = 1.43 t4 = -3.82 ADF = -2.72

Nominal imports

MV = PM * MQ

Trade balance

TB = PX * XQ - PM * MQ

Prices and wages

Private consumption deflator

DLOG(PC)=0.000583*D(QGAP) + 0.0991*DLOG(PQP) + 0.650*DLOG(PC(-4)) + 0.00339*D(T=40) + 0.149*DLOG(PM) - 0.112*(LOG(PC(-1)) + 0.271 - 0.8*LOG(PQP(-1)) - (1-0.8)*LOG(PM(-1)) - 0.7*LOG(1 + (0.01*ALV(-1))) + 0.783*RD(-1) - 0.00181*T(-1) -0.00181*(QGAP(-1)))

R2 = 0.317 t1 = 0.515 t2 = 1.81 t3 = 10.9 t4 = 5.33 t5 = 5.79 t6 = -4.74 ADF = -4.37

Public consumption deflator

DLOG(PG) = 0.798 * DLOG(WRG) - 0.238 * (LOG(PG(-1)) + 4.85 - 0.948 * LOG(WRG(-1)))

R2 = 0.231 t1 = 13.7 t2 = -3.69 ADF = -2.11

Private investment deflator

DLOG(PI) = 0.645*DLOG(PQP) + 0.157*DLOG(PM) + 0.00365*D(QGAP) - 0.0314*(LOG(PI(-1)) - 0.461*LOG(PQP(-1)) - (1 - 0.461)*LOG(PM(-1)) - 0.0169*(QGAP(-1)) + 0.0286)

R2 = 0.130 t1 = 2.44 t2 = 1.75 t3 = 0.752 t4 = -1.89 ADF = -3.62

Export prices

DLOG(PX) = 0.332 * DLOG(PWI22) + (1 - 0.332) * DLOG(PQP) + 4.72 * D(RD) - 0.329 * (LOG(PX(-1)) + 2.03 - 0.480 * LOG(PWI22(-1)) - (1 - 0.480) * LOG(PQP(-1)) + 0.00312 * T2(-1) - 8.25 * RD(-1) - 0.149 * LOG(EURDOL(-1)))

R2 = 0.230 t1 = 3.48 t2 = 3.40 t3 = -4.43 ADF = -5.11

Import prices

DLOG(PM) = 0.0194 * DLOG(OILDOL) + 0.508 * DLOG(PWI22) + 1.49 * D(RD) - 0.0762 * (LOG(PM(-1)) - 1*LOG(PWI22(-1)) + 4.65 - 0.0219 * LOG(OILDOL(-1)) - 3.75 * RD(-1) + 0.000956 * T(-1))

R2 = 0.325 t1 = 1.26 t2 = 5.85 t3 = 1.34 t4 = -1.70 ADF = -3.33

Nominal private investments

IPV = PI * IPQ

Nominal public investments

IGV = IGQ * PIG

Gross domestic product in nominal terms

GDPV = PI * IPQ + PIG * IGQ + PC * CQ + PG * GQ + PX * XQ - PM * MQ + PINV * INVQ

GDP deflator

PQ = GDPV / GDPQ

Private value added prices

DLOG(PQP) = 0.193 * DLOG(PQP(-2)) + 0.234 * DLOG(WRP) + 0.270 * DLOG(1 + (0.01*EMPTAX)) - 0.0201 * DLOG(PROD) - 0.0377 * (LOG(PQP(-1)) - LOG(WRP(-1) * (1 + (0.01*EMPTAX(-1)))) + @MEAN(LOG(PROD(-1)),"1990q1 2015q4") - 0.196 * RD(-1) + 0.00607 * T(-1) + 3.53)

R2 = 0.0212 t1 = 1.90 t2 = 2.56 t3 = 1.21 t4 = -0.841 t5 = -1.39 ADF = -0.85

Industrial sector value added deflator

LOG(PQI) - LOG(PQP) = 0.306 - 0.00348 * T

R2 = 0.922 t1 = 51.7 t2 = -34.5

Standard private wage rate index

DLOG(PWS) = -0.00176*D(UN - NAWRU) + 0.628*DLOG(PWS(-1)) + 0.283*DLOG(PWS(-4)) - 0.0119*D(T=31) + 0.0107*D(T=32) + 0.0218*D(T=71) - 0.0243*(LOG(PWS(-1)) - 4.22 -0.85*LOG(PC) + 0.00397*((UN(-1) - NAWRU(-1))) + 0.301*LOG(1 - (0.01*(TAX_APW(-1) + TEKSOVA(-1)))) - 0.45*LOG(PROD(-1)) + 7.78*RD(-5))

R2 = 0.474 t1 = -1.91 t2 = 4.68 t3 = 2.17 t4 = -12.7 t5 = 5.48 t6 = 7.67 t7 = -1.06 ADF = -6.10

Private wage drift

DLOG(WRP) = 1.24 * DLOG(PWS) + 0.0423 * DLOG(PROD) - 0.0414 * (LOG(WRP(-1)) - LOG(PWS(-1)) - 0.322 * LOG(PROD(-1)) + 0.00108 * UN(-1) + 0.336)

R2 = 0.688 t1 = 29.5 t2 = 2.95 t3 = -1.93 ADF = -1.30

Public wage rate

DLOG(WRG) = -0.00307*D(QGAP) + 0.936*DLOG(WRP) + 0.00360*D(D2008) - 0.142*(LOG(WRG(-1)) - LOG(WRP(-1)) - 0.00208 + 0.000405*T(-1) + 0.00546*QGAP(-1) + 1.21*RD(-1) - 0.0202*D2008(-1))

R2 = 0.648 t1 = -2.59 t2 = 19.6 t3 = 4.36 t4 = -3.77 ADF = -10.3

Industrial sector wage rate

LOG(WRI) = 0.0640 + 0.988 * LOG(WRP)

R2 = 0.999 t1 = 1.91 t2 = 145

Public sector balance and household income formation (mainly identities)

Households' disposable income

YHQ = WS + PROPIN - PROPEXP + ENTPIN + SOBEN + SOSOBEN + SOASS + OTTRANS - DITAX - HPAYROLL + YHQ_NONP

Wage sum

WS = WSP + WSG

Private wage sum

WSP = WSP_RES + (WRP / 100 * 9.395 * LHP / 10)

Public wage sum

WSG = WSG_RES + (WRG / 100 * 13.241 * LHG / 10)

Households' property income

LOG(PROPIN) = - 2.56 + 0.0671 * R12 + 0.402 * LOG(RENT) + 0.887 * LOG(VAP) + RESID_PROPIN

Households' property expenditure

LOG(PROPEXP) = 3.06 + 0.164 * R12 + 1.18 * log(RENT) + RESID_PROPEXP

Entrepreneurial income (net)

LOG(ENTPIN) = 2.35 + 0.402 * LOG(VAP) + 0.713 * LOG(RENT) + RESID_ENTPIN

Social security benefits received by households

LOG(SOBEN) = 2.90 + 1.14 * LOG(WRP) + RESID_SOBEN

Social assistance benefits received by households

LOG(SOASS) = 2.39 + 0.864 * LOG(WRP) + 18.4 * RD + 0.0471 * UN + RESID_SOASS

Other transfers received by households

LOG(-OTTRANS) = 5.58 - 0.0225 * UN + 0.00868 * T + RESID_OTTRANS

Direct taxes paid by households

LOG(DITAX) = - 0.264 + 1.037 * LOG(TAXINC) + RESID_DITAX

Payroll taxes paid by households

HPAYROLL = 265 + 1 * (TEKSOVA * 0.01 * WS) + RESID_HPAYROLL

Taxes revenues collected by public sector

B1 = TAXQM + TAXINC + TAXCOR + B1R - B1B

Employer's pay roll taxes collected by public sector

B2 = EMPSOC - CSOC

Employee's social contributions to public sector

B3 = HPAYROLL + CPAY

Social security benefits paid by public sector

B6 = SOBEN + SOSOBEN - CSOBEN – FSOBEN

Social assistance benefits paid by public sector

B7 = SOASS - NONPASS

Government's property expenditures (interest payments)

B10 = 428 + 0.131 * (r10 / 100) * DEBT(-1) + RESID_B10

Deprecation of public sector capital

LOG(B13) = 5.60 + 0.503 * LOG(IGV) - 0.377 * log(IGV(-1)) + 0.00991 * T + RESID_B13

Employee's social contributions

EMPSOC = 119 + 1 * (EMPTAX * 0.01 * WS) + RESID_EMPSOC

Corporate tax revenues

TAXCOR = 0.890 * TAX_C * 0.01 * CORBASE - 201 + RESID_TAXCOR

Corporate tax base

CORBASE = SURPLUS - ENTPIN

Household income taxes

TAXINC = - 1060 + 1 * (TAX_APW * 0.01 * EINBASE) + 1 * (TAX_K * 0.01 * PROPIN) + RESID_TAXINC

Entrepreneurial income (gross)

LOG(ENTBIN) = - 1.63 + 1.24 * LOG(ENTPIN) + RESID_ENTBIN

Earned income tax base

EINBASE = WS + ENTBIN - HOINC + SOBEN + SOSOBEN + SOASS - HPAYROLL + OTTRANS

Indirect tax revenues

TAXQM = 1210 + 0.980 * (ALV * 0.01 * (CV)) + RESID_TAXQM

Public deficit

GDEF = B1 + B2 + B3 + B4 - B5 - B6 - B7 + B8 + B9 - B10 - B11 + B12 + B13 - IGV - GV

Operating surplus

SURPLUS = GDPV - WS - EMPSOC - TAXQM + SUBP - KDEPR

Depreciation of capital

LOG(KDEPR) = - 1.20 + 0.965 * LOG(VA(-1)) + RESID_KDEPR

Government 10-year bond yield

R10 = 0.852 * R12(+1) - 0.385 * D(R12) + 1.83 - 12.5 * GDEF / GDPV

R2 = 0.881 t1 = 10.3 t2 = -2.30 t3 = 5.59 t4 = -2.98

Public debt

DEBT = DEBT(-1) - GDEF + DEBT_RES

VARIABLE NAMES AND DATA SOURCES

ALV	Effective indirect tax rate (OECD, Eurostat)
B1	Tax revenues collected bypublic sector (Statitics Finland)
B10	Government's property expenditures (Statistics Finland)
B11	Publicly paid subsidies (Statistics Finland)
B12	Capital transfers received by public sector (Statistics Finland)
B13	Deprecation of public sector capital (Statistics Finland)
B1B	Taxes paid by public sector (Statistics Finland)
B1R	Other tax revenues received by public sector (Statistics Finland)
B2	Employer's pay roll taxes paid to public sector (Statistics Finland)
B3	Employee's social contributions paid to public sector (Statistics Finland)
B4	Net transfers from domestic to public sector (Statistics Finland)
B5	Net foreign transfers (Statistics Finland)
B6	Social security benefits paid by public sector (Statistics Finland)
B7	Social assistance benefits paid by public sector (Statistics Finland)
B8	Net indemnity security payments to public sector (Statistics Finland)
B9	Net operating surplus and property incomes (Statistics Finland)
CORBASE	Corporate tax base (Statistics Finland)
CPAY	Corporate paid employee's social contributions (Statistics Finland)
CPI	Consumer price index (Statistics Finland)
CQ	Private consumption (Statistics Finland)
CSOBEN	Social security benefits paid by corporates (Statistics Finland)
CSOC	Employer's pay roll taxes paid to corporates (Statistics Finland)
CV	Nominal private consumption (Statistics Finland)
D2008	Dummy for year 2008
D93	Dummy for year 1993
D95	Dummy for year 1995
DEBT	Public (EMU-)debt (Statistics Finland)
DEBT_RES	Residual series for public debt (Own calculations)
DEP	Residual series for GDP from supply side (Statistics Finland)
DEPR	Depreciation rate for private capital (Statistics Finland, Own calculations)
DITAX	Direct taxes paid by households (Statistics Finland)
EINBASE	Earned income tax base (Statistics Finland)
EMPSOC	Employee's social contributions (Statistics Finland)
EMPTAX	Effective employer's pay roll tax rate (OECD, Eurostat)
ENTBIN	Entrepreneurial income (gross) (Statistics Finland)
ENTPIN	Entrepreneurial income (net) (Statistics Finland)
EURDOL	Euro / dollar exchange rate (Bank of Finland)
FSOBEN	Social security benefits paid by foreign sectors (Statistics Finland)
GDEF	Public deficit (Statistics Finland)
GDPQ	Gross domestic product (Statistics Finland)
GDPQ_S	Gross domestic product from supply side (Statistics Finland)
GDPV	Gross domestic product in nominal terms (Statistics Finland)
GQ	Public consumption (Statistics Finland)
GQP	Public purchases (Statistics Finland)
GV	Nominal public consumption (Statistics Finland)

HOINC	Income from housing (Statistics Finland)
HPAYROLL	Payroll taxes paid by households (Statistics Finland)
IGQ	Public investments (Statistics Finland)
IGV	Nominal public investments (Statistics Finland)
INVQ	Change in inventories (Statistics Finland)
IPQ	Private investments (Statistics Finland)
IPV	Nominal private investments (Statistics Finland)
KDEPR	Depreciation of capital (Statistics Finland)
KP	Private capital stock (Statistics Finland)
LH	Total labor hours (Statistics Finland)
LHG	Public sector labor hours (Statistics Finland)
LHI	Industrial sector labor hours (Statistics Finland)
LHP	Private sector labor hours (Statistics Finland)
LHS	Supplied labor hours (Statistics Finland)
LHSE	Labor hours in service (and construction) sector (Statistics Finland)
LN	Total employment (in persons) (Statistics Finland)
LS	Labor supply (Statistics Finland)
MQ	Imports (Statistics Finland)
MV	Nominal imports (Statistics Finland)
NAWRU	NAWRU rate (Own calculations, Statistics Finland, Ministry of Employment and the Economy)
NONPASS	Social assistance benefits paid by non-profit organizations (Statistics Finland)
OILDOL	Price of (Brent) oil in dollar terms (Bloomberg)
OTTRANS	Other transfers received by households (Statistics Finland)
PC	Private consumption deflator (Statistics Finland)
PG	Public consumption deflator (Statistics Finland)
PI	Private investments deflator (Statistics Finland)
PIG	Public investments deflator (Statistics Finland)
PINV	Change in inventories deflator (Statistics Finland)
PM	Price of imports (Statistics Finland)
POPEMP1564	Population with age between 15 and 64 (Statistics Finland)
PQ	GDP deflator (Statistics Finland)
PQG	Public value added deflator (Statistics Finland)
PQI	Industrial value added deflator (Statistics Finland)
PQP	Private value added deflator (Statistics Finland)
PROD	Private sector productivity (Statistics Finland)
PRODQ	Total productivity (Statistics Finland)
PROPEXP	Households' property expenditure (Statistics Finland)
PROPIN	Households' property income (Statistics Finland)
PWI22	Trade-weighted import prices of the 22 countries* (Eurostat, OECD, World Bank)
PWS	Standard private wage rate index (Statistics Finland)
PX	Price of exports (Statistics Finland)
QGAP	Output gap (Own calculations)
QPOT	Potential output (Own calculations)
R10	Government 10-year bond yield (Bank of Finland)
R12	12 months Euribor (Bank of Finland)
RD	Recession(s) dummy (Own calculations)
RESID_B10	Residual series for gov. property expenditures (Own calculations)
RESID_B13	Residual series for deprecation of public sector capital (Own calculations)
RESID_DEP	Residual series for variable DEP (Own calculations)

RESID_DITAX Residual series for sirect taxes paid by households (Own calculations)
RESID_EMPSOC Residual series for employee's soc. contributions (Own calculations)
RESID_ENTBIN Residual series for entrepreneurial income (gross) (Own calculations)
RESID_ENTPIN Residual series for entrepreneurial income (net) (Own calculations)
RESID_HPAYROLL Residual series for payroll taxes paid by households (Own calculations)
RESID_KDEPR Residual series for depreciation of capital (Own calculations)
RESID_LN Residual series for total employment (in persons) (Owncalculations)
RESID_OTTRANS Residual series for other transfers received by households (Own calculations)
RESID_PROPEXP Residual series for households' property expenditure (Own calculations)
RESID_PROPIN Residual series for households' property income (Own calculations)
RESID_SOASS Residual series for social assistance benefits received by households (Own calculations)
RESID_SOBEN Residual series for social security benefits received by households (Own calculations)
RESID_TAXCOR Residual series for corporate tax revenues (Own calculations)
RESID_TAXINC Residual series for household income taxes (Own calculations)
RESID_TAXQM Residual series for indirect taxes (Own calculations)
SOASS Social assistance benefits received by households (Statistics Finland)
SOBEN Social security benefits received by households (Statistics Finland)
SOSOBEN Other social security benefits received by households (Statistics Finland)
SUBP Subsidies (Statistics Finland)
SURPLUS Operating surplus (Statistics Finland)
T Trend
T2 Historical trend (Own calculations)
TAX_APW Effective tax rate for labor income (OECD, Eurostat)
TAX_C Effective corporate tax rate(OECD, Eurostat)
TAX_K Effective capital tax rate(OECD, Eurostat)
TAXCOR Corporate tax revenues (Statistics Finland)
TAXINC Household income taxes (Statistics Finland)
TAXQM Indirect tax revenues (Statistics Finland)
TB Trade balance (Statistics Finland)
TEKSOVA Employee's social contribution rate (Statistics Finland)
UCC User cost of capital (Statistics Finland, Bank of Finland, Own calculations)
UN Unemployment rate (Statistics Finland)
VA Nominal value added (Statistics Finland)
VAG Nominal public sector value added (Statistics Finland)
VAP Nominal private sector value added (Statistics Finland)
VAQ Value added (Statistics Finland)
VAQG Public sector value added (Statistics Finland)
VAQI Industrial sector value added (Statistics Finland)
VAQP Private sector value added (Statistics Finland)
VAQP_S Private value added defined from production function (Statistics Finland, Own calculations)
VAQSE Service sector value added (Statistics Finland)
RENT Rent prices index (Statistics Finland)
W Households' real wealth (Own calculations, Statistics Finland)
WRG Public sector wage rate (Statistics Finland)
WRI Industrial sector wage rate (Statistics Finland)

WRP	Private sector wage rate (Statistics Finland)
WS	Wage sum (Statistics Finland)
WSG	Public sector wage sum (Statistics Finland)
WSG_RES	Residual of public sector wage sum (Own calculations)
WSP	Private sector wage sum (Statistics Finland)
WSP_RES	Residual of private sector wage sum (Own calculations)
XQ	Exports (Statistics Finland)
XV	Nominal exports (Statistics Finland)
YHQ	Households' disposable income (Statistics Finland)
YHQ_NONP	Disposable income of non-profit organizations (Statistics Finland)
X22	Trade-weighted GDP of the 22 countries* (Eurostat, OECD, World Bank)

* The 22 most important countries for the Finnish exports

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